DOCUMENT RESUME

ED 086 836 CE 000 868

AUTHOR Oen, Urban T.
TITLE Investigating the Interaction of Learning Styles and Types of Learning Experiences in Vocational-Technical Education. Interim Report.
INSTITUTION Fox Valley Technical Inst., Appleton, Wis.
SPONS AGENCY Office of Education (DHEW), Washington, D.C.; Wisconsin State Board of Vocational, Technical, and Adult Education, Sheboygan.
PUB DATE 31 Aug 73
NOTE 151p.; For related document, see CE 000 867

EDRS PRICE MF-$0.65 HC-$6.58
DESCRIPTORS *Educational Research; Individualized Instruction; *Learning Characteristics; Learning Experience; *Learning Processes; Learning Theories; Questionnaires; Semantic Differential; *Student Attitudes; Student Role; Tables (Data); *Teacher Attitudes; Technical Education; Vocational Education
IDENTIFIERS *Learning Styles; Likert Type Scale

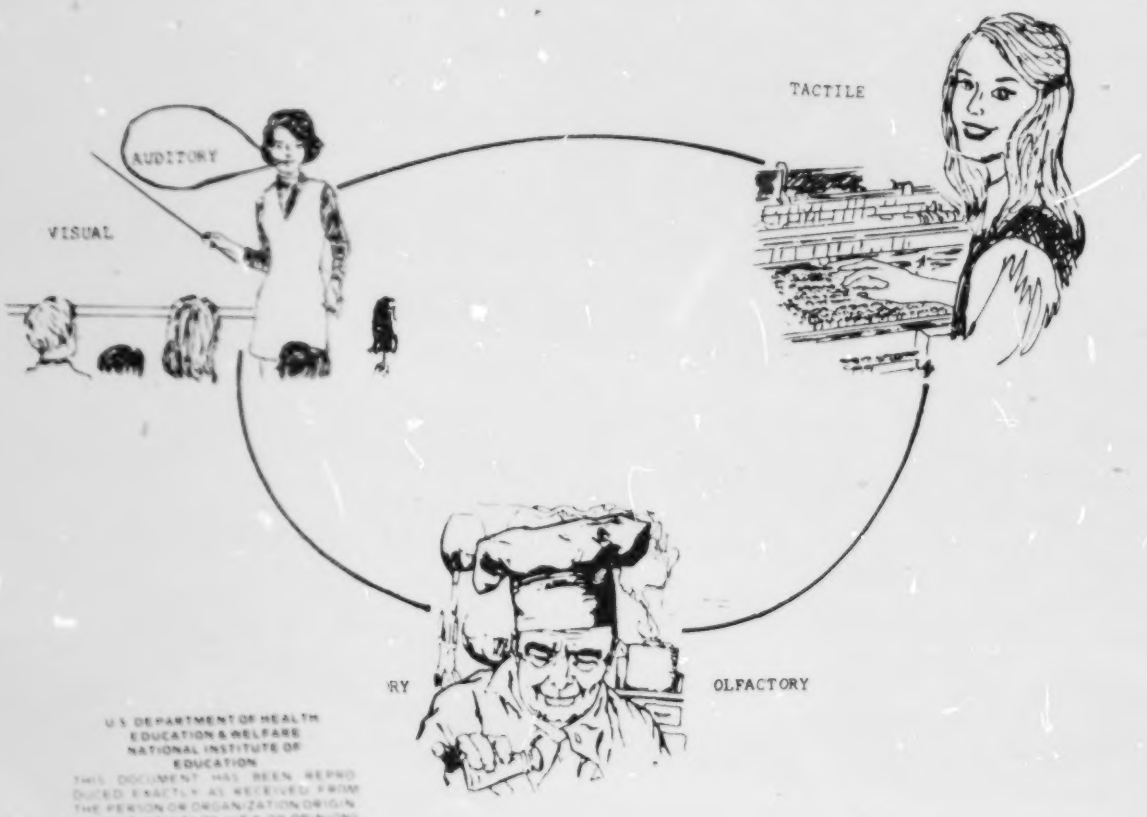
ABSTRACT

This interim report was abstracted from the many research efforts conducted at Fox Valley Technical Institute and the Center for Vocational, Technical, and Adult Education, Univ. of Wis Stout. At Fox Valley, it was attempted to identify learning styles relevant to vocational-technical education, survey students and faculty concerning individualized instruction and learning, develop an individualized learning model, and construct alternative learning experiences for meeting a given objective. At Stout, the task was to identify a sub-set of learning styles and determine their relationship to the acquisition of technical skills and knowledges (CE 000 867). Two learning style continuums were identified: concrete/symbolic and structured/unstructured. A semantic differential and a revised Likert scale (Learning Activities Questionnaire) were used to measure the continuums. The instruments were successful in determining individual learning styles and can be used by teachers for that purpose or for individualizing a program, course, or activity. Composite implications for teachers, students, and administrators in charge of curriculum were drawn. A 25-page literature review, a ten-page bibliography, and the Learning Activities Opinionnaire are included. (AG)

ED 086836

INTERIM REPORT
Project No. 12-031-151-223

INVESTIGATING THE INTERACTION OF LEARNING STYLES AND TYPES OF LEARNING EXPERIENCES IN VOCATIONAL-TECHNICAL EDUCATION



U.S. DEPARTMENT OF HEALTH EDUCATION & WELFARE NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY.

PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL HAS BEEN GRANTED BY
Fox Valley Technical Inst., Appleton, Wis
TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE NATIONAL INSTITUTE OF EDUCATION. FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER.

August 31, 1973

FOX VALLEY TECHNICAL INSTITUTE
Appleton, Wisconsin

CE 000 268

INTERIM REPORT
Project No. 12-031-151-223

INVESTIGATING THE INTERACTION OF LEARNING STYLES AND TYPES OF LEARNING EXPERIENCES IN VOCATIONAL-TECHNICAL EDUCATION

Dr. Urban T. Oen
Project Director
Fox Valley Technical Institute
Appleton, Wisconsin

August 31, 1973

The research reported herein was performed pursuant to a grant or contract with the Wisconsin Board of Vocational, Technical and Adult Education, partially reimbursed from an allocation of Federal funds from the U. S. Office of Education, U.S. Department of Health, Education and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official State Board or U. S. Office of Education position or policy.

INTERIM REPORT

INVESTIGATING THE INTERACTION OF LEARNING STYLES AND TYPES OF LEARNING EXPERIENCES IN VOCATIONAL-TECHNICAL EDUCATION

Dr. Urban T. Oen
Project Director
Program Development and
Evaluation Consultant
Fox Valley Technical Institute

John C. Banks
Subproject Director
Research Assistant
Center for Vocational, Technical,
& Adult Education
University of Wisconsin - Stout
Menomonie, Wisconsin

Originators/Supervisors Of The Project

Stanley J. Spanbauer
Assistant Director -
Instructional Services
Fox Valley Technical Institute

Dr. Orville Nelson
Research Specialist
Center For Vocational, Technical,
& Adult Education
University of Wisconsin - Stout

Published By:

Fox Valley Technical Institute
1825 North Bluemound Drive
Appleton, Wisconsin 54911

William M. Sirek
District Director

District Board of Vocational, Technical & Adult Education Members

Harland Kirchner, President
Employer Member
Waupaca County

Mildred Inman, Vice President
Employee Member
Outagamie County

Donald Hepler
Employer Member
Calumet County

Robert Schneider, Secretary
Member at Large
Outagamie County

Lonny Hanson
Employee Member
Winnebago County

Larry Berton, Treasurer
Member at Large
Winnebago County

Gaylord Unbehaun
Brillion Superintendent of Schools
Ex-Officio

ACKNOWLEDGMENTS

The writer recognizes that many educators and students through their consultation, assistance and participation in the project have contributed immeasurably to the successful completion of Phase I of the study.

Deep gratitude is expressed to John Banks, Graduate Assistant, and Dr. Orville Nelson, Professor, Center for Vocational, Technical, and Adult Education, University of Wisconsin - Stout for their valuable assistance with the research design procedures, data analysis, and especially the completion of the subcontract and resultant final report.

Special thanks is extended to the students at Fox Valley Technical Institute for their cooperation in completing the many surveys and instruments and without whose assistance the study could not have been conducted.

A sincere note of thanks is given to the Fox Valley Technical Institute teachers who allowed their students to be surveyed in addition to participating in a teacher survey and a personal interview.

Thanks is also due Dr. Orville Nelson, Professor, University of Wisconsin - Stout and Stanley Spanbauer, Assistant Director - Instructional Services, Fox Valley Technical Institute for jointly writing the proposal for the project and for the initiative of seeing it through to its successful completion.

Special thanks is also due Roland Krogstad, Director, Wisconsin Research Coordinating Unit for his assistance, suggestions, and support which have made this project possible.

Thanks is also extended to Dr. Jerry Walker, Associate Director for Evaluation, The Center For Vocational-Technical Education, The Ohio State University, Colombus, Ohio for his assistance in setting up the evaluation design and some of the procedures for the project.

Urban Oen
Project Director

FOREWORD

This interim report was abstracted from and the culmination of the many different research efforts conducted at Fox Valley Technical Institute and at the Center for Vocational, Technical, and Adult Education, University of Wisconsin - Stout. Limited copies of the different research reports listed in the Learning Styles Project Bibliography are available from the respective institutions. A composite of all these reports are on file and can be reviewed at the Wisconsin Research Coordinating Unit Office in Madison, or in the Learning Resources Center of Fox Valley Technical Institute. Your comments or inquiries regarding this project are requested and will be welcomed.

NOTE:

Permission to reproduce copyrighted material contained in this report has been granted by the copyright owners to the Educational Research Information Center (ERIC) and to the organization operating under contract with the Office of Education to reproduce ERIC documents by means of microfiche or facsimile hard copy, but this right is not conferred to any user of ERIC materials. Reproduction by users of any copyrighted material contained in documents disseminated through the ERIC system requires permission of the copyright owner.

TABLE OF CONTENTS

ACKNOWLEDGMENTS. iv

FOREWORD v

ABSTRACT OF SUMMARY OF FINDINGS. 1

LIST OF FIGURES AND TABLES ix

Chapter

I. INTRODUCTION. 7

Rationale 8
Need for the Study. 10
Problem 10
Objectives. 11
Subcontract Objectives. 12
Limitations of the Study. 12
Definition of Terms 12

II. REVIEW OF RELATED LITERATURE. 15

Learning Styles 15
Definitions of Styles 16
Types of Learning Styles. 17
Research on Learning Styles 33
Styles Which Affect Teaching and Learning 36
Summary of the Review of Related Literature on Learning Styles 37

III. METHODOLOGY AND PROCEDURES. 40

Methodology and Procedures by Objective 40
To Identify Learning Styles Relevant to Vocational-Technical Programs 40
To Develop Instruments to Measure Students' Learning Styles 40
Instrument Design and Scoring 40
Pilot Administration. 43
Pilot Instrument Reliability. 43
Final Instrument Administration 44
Final Instrument Reliability. 44
FVTI Instrumentation. 46
To Develop Instruments to Identify the Characteristics of Learning Materials and Modes of Instruction. . . . 46
To Develop an Ideal Individualized Learning Model . . 47
To Validate and Evaluate the Ideal Individualized Learning Model Via a Jury of Experts. 47

To Construct Alternative Learning Experiences Based on Each Style of Learning for Several Sets of Objectives. 47
To Determine the Interaction Between Learning Styles and the Characteristics of Learning Experiences and Modes of Instruction. 48
To Develop a Computer-Based Management System To Determine the Type of Learning Experience Appropriate for the Student 48
To Construct an Information System to Provide Feedback to Teachers on the Progress of Their Students and to Suggest Alternate Learning Experiences for the Students. 48
Phase I Activities and Time Schedule. 49

IV. ANALYSIS OF THE DATA. 54

Part I - UW-Stout Subcontract Data. 54
Concrete/Symbolic Data Analysis 54
Frequency Distribution of the Concrete/Symbolic Dimensions. 55
Group Comparisons of the Concrete/Symbolic Dimensions. 55
Structured/Unstructured Data Analysis 61
Frequency Distribution of the Structured/Unstructured Dimensions 61
Group Comparisons of the Structured/Unstructured Dimensions. 61
Learning Styles and Class Performance 71

Part II - Student Survey Data 72
Introduction. 72
Methodology 72
Data Analysis 73
Number of Students Surveyed 74
Data Analysis 75
Profile of Typical FVTI Students. 75
Other Segments of Students. 77
Human Traits of Selected FVTI Students. 77
Attitude Toward Individualized Instruction. 80
Student Attitude Toward Individualized Instruction at FVTI 83

Part III - Teacher Survey Data. 90
Introduction. 90
Methodology 90
Ratings by the Teachers 91

V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS. 100

Summary of Major Findings. 100
Profile of Typical FVTI Students 100
Other Segments of Students 101
Human Traits of Selected FVTI Students 102
Attitude Toward Individualized Instruction 103
Student Attitude Toward Individualized Instruction at FVTI. 104
Ratings by the Teachers. 107
Conclusions and Implications 110
Composite Conclusions and Implications from the FVTI Surveys 111
General Conclusions and Implications 113
Conclusions Involving Procedures for Individualizing Instruction. 114
Conclusions Pertaining to Evaluation 115
Conclusions Regarding the Role of the Instructor . . 116
Conclusions on Individualized Instruction Philosophy 117
Conclusions Pertaining to Materials Development. . . 117
Recommendations. 118
Where To Go From Here. 119

BIBLIOGRAPHY. 121

APPENDICES

A. Learning Activities Opinionnaire 131
B. Learning Styles Project Bibliography 134

LIST OF FIGURES AND TABLES

Figure — Page

4.1 Comparison of the art groups on the concrete/symbolic learning style dimensions. 59

4.2 Comparison of all groups on the concrete/symbolic learning style dimensions 60

4.3 Comparison of the art groups on the structured/unstructured learning style dimensions. 65

4.4 Comparison of all groups on the structured/unstructured learning style dimensions. 66

Table

2.1 A comparison of the different learning styles 18

2.2 Behavioral activity characteristics representing selected learning styles and possible instructional modes to accommodate the styles 31

3.1 Objectives for Phase I and the extent to which they have been met 41

3.2 Reliability coefficients for each learning style dimension of the groups tested. 45

3.3 Learning styles project: activities and time schedule - Phase I. 50

3.4 UW-Stout subcontract activities and time schedule - Phase I. 53

4.1 Item analysis of the concrete/symbolic learning style dimensions of the students surveyed 56

4.2 Frequency distribution of the art groups on the concrete/symbolic learning style dimensions 57

4.3 Frequency distribution on the concrete/symbolic learning style dimensions of the total group surveyed . 58

4.4 Item analysis of the structured/unstructured learning styles dimensions of the total group surveyed. 62

4.5 Frequency distribution on the structured/unstructured learning style dimensions of the art group. 63

4.6 Frequency distribution on the structured/unstructured learning style dimensions of the total group surveyed 64

4.7 Mean scores and standard deviations for each learning style dimension of the groups surveyed. . . . 68

4.8 t-test comparison of the mean scores of all groups on the concrete/symbolic learning style dimensions 69

4.9 t-test comparisons of the mean scores of all groups on the structured/unstructured learning style dimensions 70

4.10 Relationship between class performance and learning styles of eight highly concrete students with eight highly symbolic students 71

4.11 Percentages, means, standard deviations, and quartile deviations on the generalized situational choice inventory of selected FVTI students 76

4.12 Percentages, means, standard deviations, and quartile deviations on the human trait inventory of selected FVTI students. 79

4.13 Percentages, means, standard deviations, and quartile deviations on the individualized learning attitude scale of selected FVTI students 82

4.14 Percentages, means, standard deviations, and quartile deviations on the individualized learning student opinionnaire of selected FVTI students 88

4.15 Evaluation of individualized instruction at Fox Valley Technical Institute by the teachers using this method of instruction 95

ABSTRACT OF SUMMARY OF FINDINGS

INVESTIGATING THE INTERACTION OF LEARNING STYLES AND TYPES OF LEARNING EXPERIENCES IN VOCATIONAL-TECHNICAL EDUCATION

Overview of the Project

This project was jointly proposed and submitted by Fox Valley Technical Institute, and the Center for Vocational, Technical and Adult Education at the University of Wisconsin - Stout to the Wisconsin Board of Vocational, Technical and Adult Education. The project was undertaken to investigate the interaction of learning styles and types of learning experiences provided to students in vocational - technical education.

During the past several years Fox Valley Technical Institute has been engaged in a number of curriculum modifications whereby the instructional materials for a number of different courses and/or programs were reorganized into individualized experiences. An investigation of learning styles was undertaken to provide supportive data to improve learning systems, especially as these systems relate to individualized instruction.

Rationale

Much of the current research on educational methodologies points out the need for research on learning styles; i.e., a student's preferred mode of learning. Limited research to date points out that students have differential rates of learning via varying instructional modes. Also, students learn better when exposed to some learning experiences than when exposed to others. A number of cognitive, affective and psychomotor variables influence learning. Thus, there is a need to investigate the patterns in which these variables aggregate to form learning styles and how these styles interact with various modes of instruction, curriculum content, mediation, and teaching environment.

Objectives of the Study

1. To identify learning styles relevant to vocational-technical programs.
2. To develop instruments to measure a student's learning style(s).
3. To develop instruments to identify the characteristics of learning materials and modes of instruction.
4. To develop an ideal individualized learning model.
5. To validate and evaluate the ideal individualized learning model via a jury of experts.

6. To construct alternative learning experiences using the model based on each style of learning.

7. To determine the interaction between learning styles and the characteristics of learning experiences and modes of instruction.

8. To develop a computer based management system to determine the type of learning experiences appropriate for the student.

9. To construct an information system to provide feedback to teachers on the progress of their students and to suggest alternate experiences for the students.

Method of Investigation

The major emphasis of the project at Fox Valley Technical Institute was to identify learning styles relevant to vocational-technical education, to survey students and faculty concerning individualized instruction and learning, to develop an individualized learning model, and to construct alternative learning experiences for meeting a given objective.

The major emphasis of the subcontract with the University of Wisconsin - Stout was to identify a sub-set of learning styles and to determine their relationship with the acquisition of technical skills and knowledges.

This project identified a sub-set of learning styles which appeared to be most applicable to vocational-technical programs. These styles were further refined by developing a working definition and matrix for each learning style sub-set.

This development formed the basis for the formulation of a learning styles attitudinal survey. A random sample of students enrolled at Fox Valley Technical Institute and the University of Wisconsin - Stout completed this instrument to provide data on the relationship between their tested learning style and the program of studies in which they were currently engaged.

This study specifically identified two learning style continuums relevant to vocational and technical education programs. These two continuums were labeled as (1) concrete/symbolic and (2) structured/unstructured. To measure these continuums two instruments were originally developed, a semantic differential and a Likert scale. The pilot instruments were administered at the Fox Valley Technical Institute. Based on data gathered from the instruments, an individual was placed somewhere along each of the continuums. The relative position on a continuum determined the extent the individual was influenced by a particular learning style. An individual who located near the continuum midpoint would be affected by a composite of the continuum

learning styles. A position near a continuum end was determined to show the individual as being highly affected by that style.

Data gathered from the pilot administration were used to revise the instrument, to improve reliability, to improve the clarity of the instrument and to determine concurrent validity of the dimensions investigated. The semantic differential instrument was discontinued and revisions were made in the Likert scale. The Likert scale was reproduced and arrangements were made to readminister it.

The revised Likert scale, called a Learning Activities Questionnaire was readministered to a group of students at Fox Valley Technical Institute and to a group of students on the University of Wisconsin - Stout campus.

Findings

The subcontract study indicates:

1. The final instrument can effectively determine an individual's learning style based on the variables investigated in the study.

2. Students tend to enroll in programs of study that match or complement their particular style of learning.

3. Students viewed themselves as functioning effectively in a learning strategy that reflected a mix or composite of structured/unstructured learning styles.

4. Students who participated in the instrument administration at Fox Valley Technical Institute tended to have concrete learning styles.

5. That data from the instrument can provide information on those individuals enrolled in a program displaying a learning style different from the group or different from the style necessary to effectively function in a program of studies.

6. Those students who should be offered instruction via alternative modes of presentation.

7. That a classroom teacher can be provided with a simple, easily handled and easily scored instrument to effectively determine a student's learning style as investigated in the study.

8. That a teacher may use the Learning Activities instrument to make judgments about individual students when attempting to individualize and personalize a program, course or activity.

Implications of the research studies conducted at FVTI

The following composit implications were formulated from the teacher, supervisory, and student surveys.

1. Teachers can be effective with individualized instruction techniques if they:

   A. Understand their role with this method of instruction.

   B. Are properly trained to teach on an individualized basis.

   C. Are committed to the philosophy of individualized instruction.

   D. Take an active part in the development of audiovisual and curricular materials.

   E. Know what concepts, principles, or skills are to be developed in the students.

   F. Incorporate a wide variety of motivational techniques into their course or program.

   G. Are provided time to work with the students individually.

   H. Are student oriented. (people oriented)

   I. Provide structure for those students who need it.

   J. Make a concerted effort to meet with the slower students and provide them with needed help.

   K. Base course grades on speed and quality of work according to predetermined criteria.

   L. Provide alternative forms of learning to meet a given student performance objective.

2. Individualization of instruction is effective if the students:

   A. Are properly oriented and acclimated to this type of instruction.

   B. Can set their own goals.

   C. Are actively involved.

   D. Can proceed at their own pace.

   E. Can evaluate their own progress.

F. Are interested in the subject and if the subject meets the students' needs and is geared to their abilities.

G. Are self-motivated.

H. Can attend classes on a volunteer basis.

3. Individualized instructional units are an effective means of teaching if:

A. They are self-instructional.

B. The lessons contain student performance objectives.

C. Different learning materials are available to accommodate different learning styles.

D. Adequate materials and facilities are made available.

E. Content relies on reality and actual experiences.

F. They involve the interaction of persons, procedures and materials. (persons, processes and properties)

G. The teacher is actively involved.

H. The courses or programs, if possible, provide for open-entry/open-exit.

4. An individualized curriculum allows each student to progress at his own best rate of speed commensurate with his abilities, interests, needs, and motivational patterns if:

A. Appropriate audiovisual and curriculum materials are available.

B. The student is interested in studying on a totally individualized basis.

C. The materials are written and portrayed* at the ability level of the student. (*The hardware must also be at the level of the student.)

D. The subject being studied is of interest to the student.

E. The whole course or program is individualized.

F. The instructor provides the personal attention and motivation necessary for the student to complete the course or program.

5. The ideal individualized learning model and resultant materials are very useful and have implications for continued individualized course and program development.

6. 30.8% of the FVTI students would prefer to complete courses via self-instructional techniques with films, slides, and tapes always available.

7. 46.1% of the FVTI students prefer to attend classes where they can interact with a small group of students or work 1 on 1 with the teacher.

8. 71.6% of the FVTI students prefer to attend classes that allow them to learn at their own best rate and to take tests whenever they feel they are ready.

CHAPTER I

INTRODUCTION

Fox Valley Technical Institute and other Vocational, Technical and Adult Education District Schools in Wisconsin have begun to focus considerable attention to the individualization of instruction to meet the diverse needs of the post-secondary students and adults enrolled in vocational-technical education programs. Last year alone, the district serviced over 21,000 adults via specialized seminars, classes, courses, and programs lasting from one day to two years. The adults enrolling in these seminars, classes, courses and programs have a variety of backgrounds (educational, economic, cultural, ethnic) and hold differing vocational, technical and occupational objectives. Because of this, teachers are finding it increasingly difficult to teach. The teaching approach and the learning materials must be adapted to meet the needs of these heterogeneous students in a single classroom.

Obviously, it is impossible to organize specialized classes to meet the needs and objectives of all students enrolled in vocational-technical programs. The number of classes required would far exceed the supply of teachers available. In addition, the practicality of providing such specialized classes, each having a limited enrollment, could not be justified. One approach to accomplish the needs and objectives of the students is through individualized instruction.

In an attempt to respond to the varying needs of students, schools have developed Unipacs, Steps, ISU's, SLATES, AVT labs, etc. To date, most of these individualized techniques focus on time. In other words, students can proceed at their own pace, but must utilize and repeat the same learning experiences until they attain the predetermined criterion performance level. These learning experiences as prepared by a teacher or commercial concern have not especially been based upon the actual needs of the students but upon what is felt that they need. In addition, certain developmental assumptions were made by the developers of individualized materials (few of which have been substantiated by research). Some of these are:

1. The learner becomes more active and involved in the learning process.

2. An individualized curriculum allows each student to progress at his own best rate of speed commensurate with his abilities, interests, needs, and motivational patterns.

3. By removing the competitiveness and freeing the learner from the pace of his classmates, he can more easily succeed.

4. That students prefer to work on a 1:1 or small group individualized basis.

5. That all course work can be effectively individualized.

6. With individualization, the student: teacher contact increases.

Much of the research today has focused on method, i.e., individualized vs. lecture-discussion, etc., rather than on "how" students learn, "how" students prefer to learn, and "how" can educators facilitate student learning. Of the many different research studies conducted on individualized instruction, many point out the need for research on learning styles. Specific recommendations of these studies state that instruction and learning materials should be designed or constructed based upon the way students prefer to learn.

Several recent studies on learning styles have been completed but these studies were a comparison between different styles and not an attempt to match learning styles to student needs. In addition, many of the learning styles studies have been limited to the cognitive domain.

A factor compounding the problems of individualized instruction is that much of the audiovisual and curricular materials may be inappropriately designed and used for individualized instruction. Many AV materials were originally designed to "supplement" instruction with their use controlled by the instructor. Today we can see these same AV materials being used to "supplant" instruction with little or no modification being done to the materials which were designed to supplement instruction.

Rationale

An instructional system is comprised of the learner, teacher, learning environment, instructional modes, content based on a task analysis, and the interaction between these elements. Research on learning in the laboratory and in the classroom suggests that students have differential rates of learning via various instructional modes. Recent concern with disordinal interactions is evidence of the differing impacts various instructional treatments have on learners. (An example of a disordinal interaction is when one ability group learns more under treatment 1 and a second ability group learns more under treatment 2.)

Different variables influence learning. Bruner (1964) concluded that man's attempts to comprehend events and phenomena involved a process of first viewing them in terms of their concrete physical properties and then moving to a comprehension of the symbolic commonalities encompassed in them. In some instances Bruner felt that the concrete state could be by-passed if the learner had a highly developed cognitive system and the appropriate set of symbols. Bloom's taxonomy for the cognitive domain and Gagne's learning hierarchy suggest hierarchies of cognitive performance, each higher level being dependent upon the prior levels.

Bruner's conclusions suggest the need for hands-on or concrete experiences early in the development of new concepts and skills. The taxonomy for the cognitive domain suggests that the sequences of

learning encountered in acquiring cognitive skills are critical. Gagne's work indicates the conditions presented to the learner are critical. In reviewing task analysis techniques and procedures, Campbell (1971) concluded that learning is a multi-variant process in that a number of task and personalogical variables interact in the process of learning.

Affective variables also influence learning and students' behaviors. An endless number of students have avoided certain classes or commented that they did not work up to capacity because "they could not get along with the teacher," or "did not like the subject." In a recent study conducted by Spanbauer (1972) at Fox Valley Technical Institute, statistically significant and high correlations were observed between teachers' personality characteristics and the students' perceptions of effective teaching. Anderson (1970) found that several dimensions of the social climate in the learning environment influenced learning. There was a significant relationship between intimacy (degree to which members of the class were personal friends) and learning. Also, the degree to which students were challenged was significantly related to learning. Walberg and Ahlgren (1970) found that classroom social environment can be predicted from the characteristics of the students in the class.

Studies of psychomotor learning have also revealed a number of variables that influence the acquisition of skills. Practice schedules, knowledge of results, delay in feedback, and cognitive variables have been demonstrated to affect psychomotor learning.

In summary, a number of cognitive, affective, and psychomotor variables influence learning. Thus, there is a need to investigate the patterns in which these variables aggregate to form learning styles and how these styles interact with various modes of instruction.

With increased interest in tailoring instruction and learning experiences to fit the needs of individuals, it is very important that additional variables beyond that of time be explored and evaluated. Only as more sophisticated knowledge is acquired in these realms will it be possible to truly individualize instruction. In addition to maximize the use of this knowledge to individualize instruction there is a need to explore ways to quickly and efficiently handle this information in selecting appropriate learning experiences.

It seems reasonable to suggest that no one teaching strategy would be best for all students since students vary greatly in their learning styles. Some methods may favor one type of student while other teaching methods might facilitate the achievement of a different type student. Additionally, one teaching strategy might be superior when a test of highly specific information (low in the cognitive domain) is utilized as a criterion measure while a second strategy would produce greater student achievement when a test of concepts and generalizations (high in the cognitive domain) is used as a dependent measure. The current study seeks to investigate some of these hypotheses.

Need for the Study

Briefly, the need for this study may be summarized as follows:

1. There is a need to ascertain whether student learning can be executed more effectively and efficiently by basing learning upon students' preferred learning styles.

2. There is a need to determine whether there is a difference in what can be learned by students via individualized instructional techniques.

3. There is a lack of sufficient research to substantiate whether slow learners and low-motivated students can learn via individualized techniques.

4. There is a need to identify the learning styles and characteristics of students and to match these with learning materials designed to facilitate these styles and characteristics.

5. There is a need to develop an "ideal" individualized learning model which encompasses all the characteristics known or determined on learning.

6. There is a need to try out the individualized learning model via field testing techniques and to answer the following questions:

   A. Is the individualized learning model practical and usable?

   B. Is the individualized learning model inclusive of the components, elements, and activities necessary to develop optimum learning situations?

   C. Is the model adaptable from one vocational-technical area to another?

   D. Can instructors develop ideal learning situations based upon the model?

   E. Can student learning be executed more efficiently and effectively as a result of developing instruction based upon the learning model?

Problem

To determine the characteristics of learning experiences, the nature of learning styles of students, and the interaction between

these variables and to assess their impact upon learning in post-secondary vocational-technical education programs.

Objectives

1. To identify learning styles relevant to vocational-technical programs.

2. To develop instruments to measure a student's learning style(s).

3. To develop instruments to identify the characteristics of learning materials and modes of instruction.

4. To develop an ideal individualized learning model.

5. To validate and evaluate the ideal individualized learning model via a jury of experts.

6. To construct alternative learning experiences using the model based on each style of learning.

7. To determine the interaction between learning styles and the characteristics of learning experiences and modes of instruction.

8. To develop a computer based management system to determine the type of learning experiences appropriate for the student.

9. To construct an information system to provide feedback to teachers on the progress of their students and to suggest alternate experiences for the students.

Subcontract Objectives

The objectives guiding the subcontract study were to:

1. Identify learning styles relevant to vocational-technical programs.

2. Select a sub-set of learning styles and develop the instrumentation required to measure them.

3. Develop a student reaction instrument to determine the degree to which students perceive that selected learning styles influence their acquisition of technical skills and knowledges.

4. Develop a matrix to visually depict the learning style continuums investigated.

5. Determine the degree to which learning styles correlate with a student's success in his chosen study program.

6. Initiate the design of a computer-based management system to process the information required to determine the type of learning experience appropriate for each student.

7. Provide the classroom teacher with an easily administered and easily scored learning styles attitude instrument giving him an opportunity to assess a student's style.

8. Provide a means of motivation to teachers and administrators to consider all variables of learning when assessing an individual.

Limitations of the Study

1. The study was limited to full-time students randomly selected via intact classrooms at Fox Valley Technical Institute.

2. The subcontract was limited to two sets of all the learning styles identified.

3. The study was limited to attitudinal responses on different instruments which may not have fully measured the students total style.

Definition of Terms

For the purpose of this study, the following terms will be used in these capacities:

1. Antecedent variables.--Variables that are measured or determined before instruction begins.

2. Attitude toward individualized instruction.--The student's or faculty's feeling or mood toward individualized instruction. A student's attitude toward individualized instruction was measured by a 20-item Likert type forced-choice scale. A student's attitude toward individualized instruction at Fox Valley Technical Institute was determined by a 57-item Likert type forced choice student opinionnaire. The faculty's attitude toward individualized instruction was determined by a 43-item Likert type forced choice teacher survey.

3. Audiovisual and curriculum materials.--Any aids used to enhance teaching and learning; for this study the printed individual study units, different sets of 2 x 2 colored slides and scripts, projector-viewers, video and audio tape recorders, electronic calculators and equipment, all audiovisual equipment used in the course, manuals and handouts, and publications and charts from educational institutions and commercial companies.

4. Competency.--Having the knowledge, fitness or ability to perform a specific skill.

5. Concrete learning style.--A preferred learning strategy employed by the individual where optimum learning is affected by that individual in a situation that allows the learner to become personally and actively involved with an object or in direct contact with phenomena with "hands on" experience.

6. Effectiveness.--Refers to the resulting competencies the course or program produces in the students.

7. Individualized instruction.--Refers to a method of instruction in which each pupil works alone, or in a small group, on assignments designated to meet his interests, needs, and abilities, at his own pace. The subject matter studied may be cooperatively determined by the teacher and the learner. During classtime the teacher is available to answer questions and provide needed assistance.

8. Individualized learning.--Refers to learning in which a student works at a pace suited to his needs and abilities. The student may work as an individual or in a small group. In this type of learning the teacher works with the pupils on an individual or small group basis. The student is mainly responsible for his learning.

9. Individualized learning unit or manual.--A series of lessons of related subject matter, each of which is sub-divided into the following pattern: lesson title, terminal behavioral objectives, text, learning activities, and evaluation activities.

10. Interest.--A reasoned enthusiasm one holds for some subject. In this study, interest refers to enthusiasm exhibited by a student toward work in his chosen field.

11. Jury of experts.--A competent group of people recognized by others in their respective fields as being authorities.

12. Job-entry.--Refers to a beginning level of entry into a job.

13. Learning style.--Consistant patterns of behavior or activity preferred and employed by the individual to effectively and efficiently acquire knowledge, skills and attitudes.

14. Structured style.--A preferred learning strategy employed by the individual where optimum learning is affected by the learner in a highly organized situation. The sequence and form of instruction are determined prior to engaging in the learning activity.

15. Student's preference.--The student's preference for learning or studying was determined by a 30-item forced choice scale entitled: The Generalized Situational Choice Inventory.

16. Student's traits.--The study habits and traits of students was determined by a 29-item forced choice Human Trait Inventory.

17. Symbolic style.--A preferred learning strategy employed by the individual where optimum learning is affected by that individual in a situation that allows the learner to engage in a wide variety of mediated, computational, reading or verbal interaction to achieve learning.

18. Terminal behavioral objective.--An objective stated in terms of a desired behavior to be demonstrated by the learner at the termination of formal study.

19. Unstructured learning style.--A preferred learning strategy where optimum learning is affected by the learner in an unorganized situation. The student utilizes a random pattern of personal selection and involvement in learning activities and objectives and a specific sequence are avoided.

20. Vocational and occupational objectives.--Refer to the specific area or field of employment in which students are preparing to enter upon graduation from the technical institutes.

21. Vocational-technical education.--Refers to those educational activities relating to the preparation of students for employment in the following general occupational areas: agriculture, business, health, home economics, trade and industrial, and service occupations.

CHAPTER II

REVIEW OF RELATED LITERATURE *

The term "style" has many different connotations to different people. We hear for example that a person has a certain style of speaking, dressing, living or even learning. In an effort to bring the Learning Styles Project into proper perspective, it is necessary to: (1) review the different definitions of styles, (2) list the types of styles which affect teaching and learning, and (3) review pertinent related research on learning styles.

Learning Styles

Hill (1971b) in a recent manuscript provides the proper setting for styles. He states:

> During the latter half of the 1930's, many psychologists were particularly interested in the study of the consistency and predictability of personality. In the early 1940's, Allport suggested the concept of "style," which essentially he defined as the consistency and pattern of expressive behaviors that individuals manifest in performing various types of activities. In the context of Allport's descriptive definition of style, the term is highly similar to its common use in such expressions as: an individual's way (style) of living, a style of speaking, a writing style, or style of dress. This orientation permits the use of the term "style" to denote an entire pattern of responses, i.e., it can refer to not only a particular way of life, but to a particular class of events (e.g., style of speaking). In this sense, the term "style" is both general and relatively specific, i.e., it is not restricted to a particular denotation (e.g., all aspects of response patterns).

Studies by Rosenberg (1968) Dunn and Dunn (1972); Tallmadge and Shearer (1969) and DeCecco (1968) have mentioned that a child's learning style should be considered when developing an individualized program of studies. Dunn and Dunn (1972) further stated that the skills, abilities, interests, learning styles, motivation, and goals, etc. should all be assessed when diagnosing learning activities for an individual.

---

*Permission to reproduce copyrighted material contained in this Chapter has been granted by the copyright owners to the Educational Research Information Center (ERIC) and to the organization operating under contract with the Office of Education to reproduce ERIC documents by means of microfiche or facsimile hard copy, but this right is not conferred to any user of ERIC materials. Reproduction by users of any copyrighted material contained in documents disseminated through the ERIC system requires permission of the copyright owner.

Various learning characteristics have most often been studied with respect to content or difficulty of the level of instruction. In a report by Krogstad (1972) a large quantity of dependent and independent learning variables were isolated. He has suggested that learning style is an independent learner variable.

Definitions of styles

Many authors use the term "cognitive style" to refer to a student's learning style. For instance Kagan, Moss, Sigel, Hill, Nunney, and Witkin all use the term cognitive style. Kagan, Moss and Sigel (1963) defined cognitive style as a "term that refers to stable individual preferences in mode of perceptual organization and conceptual categorization of the external environment." In a recent study Davis (1971) stated that the term "relates to consistencies that individuals of various ages demonstrated in their functioning in a variety of tasks and situations." The above authors appear to be referring to the way an individual views his/her learning environment.

A study conducted by Satterly and Brimer (1971) made reference to Witkin's definition of cognitive styles as "manifestations in the cognitive sphere of still broader dimensions of personal functioning which cut across diverse psychological areas and represent different ways of cutting the personality pie from those traditionally used." Witkin's definition may indicate something other than cognitive learning. Shouksmith (1969) stresses the superordinate nature of the term and has employed it to refer to "the amalgam of the strategies a person employs in his approach to problems."

Taba, Levine, and Elzey (1964) have defined learning style as the:

> ...modes of thought which an individual employs rather persistently in the variety of different cognitive tasks, such as: selecting a basis for grouping objects, determining how to label what he sees and how to organize the various aspects of his environment.

Rosenberg (1968) states that "learning styles refer to an individual's characteristic pattern of behavior when confronted with a problem. If a person is observed in a number of different problem-solving situations, a modal pattern of behavior can usually be ascertained. It is this modal pattern of his behavior that he refers to as his style." DeCecco (1968) suggests that learning styles are "personal ways in which individuals process information in the course of learning new concepts and principles."

Tallmadge and Shearer (1969) have operationally defined learning style as "an attribute of an individual which interacts with instructional circumstances in such a way as to produce differential learning achievement as a function of these circumstances." Their investigation was concerned primarily with relationships existing between learner characteristics and the method, rather than content, of instruction. A wide variety of individual difference measures were collected from the experimental students to enable identification of relevant learner characteristic variables.

Types of Learning Styles

Numerous authors have identified and defined various learning styles. Table 2.1 contains a summary and comparison of these different learning styles by author. The following is a discussion of many of the styles by author and an interpretation of their meaning.

Rosenberg (1968) identified four styles as being:

A. Rigid inhibited - a tightly closed system for processing information such that both intrapersonal and extrapersonal sources of information are suppressed. This learner may exhibit the following behavioral characteristics:

1. Can not get the job done unless others are immediately available to him.
2. Oblivious to what is going on in the classroom.
3. Becomes confused and disorientated easily.
4. Misinterprets simple statements.
5. Gives answers which have nothing to do with the questions being asked.
6. Afraid to assert self or show initiative.
7. Shows signs of nervousness (nailbiting, crying, rocking).
8. Generally unresponsive, hard to get to know.
9. Upset by change in routine.
10. Rigidly adheres to rules.

B. Undisciplined - this person tends to be overly sensitive to intrapersonal sources of information and has not learned to

TABLE 2.1

A COMPARISON OF THE DIFFERENT LEARNING STYLES

Learning Styles or Style Elements	Authors of the Styles or Style Elements																								
	Riessman	Kagan, Moss, Sigel	Davis	Taba, La Vine, Elzey	Rosenburg	DeCecco	Kagan	Pill and Hunney	Holland	Bruner	Witkins	Bruner, Oliver/Greenfield	Nelson	Gen	Banks	Dunn and Dunn	Bruner	Osgood							
1. Visual	X							X																	
2. Oral - Aural	X							X																	
3. Physical/Tactile	X							X																	
4. Descriptive		X																							
5. Relational-contextual		X																							
6. Inferential-categorical		X																							
7. Modes of thought				X																					
8. Perceptual/conceptual categorization of the external environment			X																						
9. Personal ways in which individuals process information in the course of learning new concepts & principles						X																			
10. Rigid inhibited					X																				
11. Undisciplined					X																				
12. Acceptance anxious					X																				
13. Creative					X																				
14. Impulsive / Reflective							X																		
15. Analytic/non-analytic							X																		
16. Auditory								X																	
17. Olfactory								X																	
18. Savory								X																	
19. Proprioceptive								X																	
20. Code - empathetic								X																	
21. Code - esthetic								X																	
22. Code - ethic								X																	
23. Code - histrionic								X																	
24. Code - Kinesics								X																	
25. Code - Kinesthetic								X																	
26. Code - proxemics								X																	
27. Code - symnoetics								X																	
28. Code - transactional								X																	
29. Realistic									X																
30. Investigative									X																
31. Artistic									X																

TABLE 2.1 --continued

Learning Styles or Style Elements	Authors of the Styles or Style Elements																								
	Riessman	Kagan, Moss, Sigel	Davis	Taba, La Vine, Elzer	Rosenburg	DeCecco	Kagan	Hill and Nunney	Holland	Bruner	Witkins	Bruner, Oliver & Greenfield	Nelson	Oen	Banks	Dunn and Dunn	Bruner	Osipow							
32. Social									X																
33. Enterprising									X																
34. Conventional									X																
35. Conservative focusing										X															
36. Focus gambling										X															
37. Simultaneous scanning										X															
38. Successive scanning										X															
39. Analytic - active											X														
40. Global - passive											X														
41. Concrete/symbolic												X													
42. Group vs. individualized													X	X	X										
43. Interaction vs. minimum interaction													X	X	X										
44. Organized vs. unorganized													X	X	X										
45. Structured vs. unstructured													X	X	X										
46. Time																X									
47. Schedule																X									
48. Amount of Sound																X									
49. Type of Sound																X									
50. Type of Work Group																X									
51. Amount of Pressure																X									
52. Type of Pressure and Motivation																X									
53. Place																X									
54. Physical Environment and Conditions																X									
55. Type of Assignments																X									
56. Perceptual Strengths and Styles																X									
57. Type of Structure and Evaluation																X									
58. Enactive Representation																	X								
59. Iconic Representation																	X								
60. Symbolic Representation																	X								
61. Field Dependence																		X							
62. Field Independence																		X							

effectively utilize extrapersonal sources of information. This learner may exhibit the following behavioral characteristics:

1. Negativistic - "I won't."
2. Acts defiantly, will not do what is asked.
3. Lacks tolerance for tasks he does not enjoy.
4. Tends toward temper tantrums and wild destruction.
5. Asserts independence in a negative manner.
6. Antisocial tendencies, (steals, lies, destroys property, bully, defies, resents discipline).
7. Speaks disrespectfully to the teacher.
8. Prone to blame teachers for external circumstances when things don't go well.
9. Makes derogatory remarks about the subject being taught.
10. Breaks classroom rules, destructive.

C. Acceptance Anxious - this person tends to be overly sensitive to extrapersonal sources of information and has not learned how to effectively utilize intrapersonal sources of information. This learner may exhibit the following behavioral characteristics:

1. Tries too hard.
2. Wants to show off or impress others.
3. Overly sensitive to criticism or correction.
4. Worries about pleasing others.
5. Frequently seeks teacher contact and approval.
6. Excessively competitive and jealous.
7. Tries to out-do classmates by producing more quantity.
8. Outwardly nervous during tests.
9. Fearful of failure.
10. Friendly rather than distant in relationships with teacher.

D. Creative - this person has learned how to harmonize the utilization of both extrapersonal and intrapersonal sources of information such that maximum utilization can be made of both learning activities. The learner may exhibit the following behavioral characteristics:

1. Tells stories or describes things in an interesting fashion.

2. Is open to new ideas.

3. Shows persistence in attacking problems.

4. Thinks creatively in new situations.

5. Able to apply what he has learned to a new situation.

6. Constructively asserts himself.

7. Shows initiative in bringing things which relate to class work.

8. Is flexible.

9. Likely to know the material when called upon to recite in class.

10. Shows respect for teachers but can stand on his own two feet.

It is Rosenberg's belief that the style a person develops depends on two dimensions of his information - process ability: (1) locus of information and (2) level of symbolization. Locus of information involves the degree to which a learner is open to receiving information from two sources: information from within and from outside himself. Level of symbolication is the level of abstraction with which the learner is able to symbolically manage information in a problem-solving situation.

Within the four styles a continuum of adaptive to maladaptive behavior is postulated. Individuals may be using the same style, but one might be more effective in utilization than the other. Rosenberg hopes that utilization of his four styles in classifying students will enable the teacher to (a) anticipate how the student will relate intrapersonally with peers and with authority and (b) anticipate how the student is likely to select, integrate, and act upon information presented to him in a learning situation (Rosenberg, 1968).

Rosenberg (1968) comments further on the three components of diagnostic teaching as being:

1. The possession of a clear teaching objective and knowledge of steps necessary to reach this objective.

2. The ability of the teacher to thoroughly assess the individual differences that significantly influence the child's learning abilities. This involves an assessment of his specific learning skills and of his learning style.

3. That the teacher "harmonize" or "fuse" the curriculum with the unique competencies, needs and interests of each pupil.

In order to truly individualize the learning situation, one must assess all characteristics of an individual, be aware that different characteristics exist in all students, and be competent in making value judgments that affect learning based on these variables.

Bruner (1966) alludes to three particular styles of learning. He states that:

> Any problem within a domain of knowledge can be represented in three ways: by a set of actions appropriate for achieving a certain result (enactive representation); by a set of summary images or graphics that stand for a concept without defining it fully (iconic representation); and by a set of symbolic or logical propositions drawn from a symbolic system that is governed by rules or laws forming and transforming propositions (symbolic representations).

Oliver and Hornsby (1966) offer some clarification to Bruner's three styles by defining them as:

> Enactive Representation - things should be seen as alike on the basis of a common role in some action (doing).
> Iconic Representation - might more likely be accomplished by grouping items according to perceptual kinships or likeness (sensing).
> Symbolic Representation - might well be expected to be covered by such grammatical principles as synonymy, superordination, or syntactic substitutability.

Bruner suggests possible situations to activate effective learning when dealing with these representations. A properly constructed curriculum would provide for differences in children, different ways of sequencing learning, opportunities for some children to "skip" parts while others work their way through, and different ways of putting things (Bruner, 1966).

The concept of style as employed by Hill at Oakland Community College is different from those styles mentioned previously and is an

elaborate and comprehensive undertaking. Hill (1971 c) states that:

> Oakland Community College accepts the premise that no two students seek meaning in exactly the same manner. We believe that 90% of the students with normal ability can learn 90% of the material 90% of the time if the teaching methods and media are adjusted to the student's educational cognitive style. The College maps the cognitive style of each student to provide a picture of the various ways in which he searches for meaning. Each student has his own cognitive style or way of seeking meaning or knowing.
>
> An individual's cognitive style is determined by the way he takes note of his total surroundings - how he seeks meaning, how he becomes informed. Is he a listener or a reader? Is he concerned only with his own viewpoint or is he influenced in decision-making by his family or associates? Does he reason as a mathematician, or as a social scientist, or as an automotive mechanic?
>
> These are but a few examples of the facets of human makeup that are included in a student's cognitive style. Family background, life experiences, and personal goals make each of us unique. Each map reflects each student's cognitive style. A cognitive map provides a picture of the diverse ways in which an individual acquires meaning. It identifies his cognitive strengths and weaknesses. This information can be used to build a personalized program of instruction.
>
> Results from a battery of tests and inventories are processed through the College's computer system to produce a map of cognitive traits that describe the many ways each student might seek meaning. Cognitive maps are printed out in the form of a cartesian product of three sets. The first set indicates a student's tendency to use certain types of symbols, his ability to understand words and numbers, qualitative sensory symbols, qualitative programmatic symbols, and qualitative codes. The second set indicates influences which the student brings to bear in deriving meaning from symbols. These influences are effected mainly in terms of his own individuality (I), or his associate's (A) perceptions, or those of his family (F). The third set indicates the manner in which he reasons, or the way in which he infers. Whether he thinks in categories (M), or in terms of differences (D), or synthesizes multiple relationships (R), or

uses all three (L), his modality of inference influences, and is influenced by, symbols and the cultural determinants he employs in his style. These three sets of elements, i.e., symbolic mediation, cultural determinants, and modalities of inference, comprise the cognitive style of the individual. A maximum of 2,560 different profiles of these elements are possible for an individual to show in his map at a given level of educational development.

The system used at Oakland Community College includes two types of symbols, theoretical (words and numbers) and qualitative (sensory, programmatic and codes). There are 20 qualitative symbols included in the "symbolic" set; five of which are associated with sensory stimuli, five that are programmatic in nature and ten associated with cultural codes.

There are two main types of theoretical symbols - auditory and visual - each of which can be divided into linguistic and quantitative elements. The four theoretical symbols are defined as follows:

T(VL) Theoretical Visual Linguistic - ability to find meaning from words you see.

T(AL) Theoretical Auditory Linguistic - ability to acquire meaning through hearing spoken words.

T(VQ) Theoretical Visual Quantitative - ability to acquire meaning in terms of numerical symbols, relationships, and measurements.

T(AQ) Theoretical Auditory Quantitative - ability to find meaning in terms of numerical symbols, relationships, and measurements that are spoken.

The five qualitative symbols associated with sensory stimuli are:

Q(A) Qualitative Auditory - ability to perceive meaning through the sense of hearing.

Q(O) Qualitative Olfactory - ability to perceive meaning through the sense of smell.

Q(S) Qualitative Savory - ability to perceive meaning by the sense of taste.

Q(T) Qualitative Tactile - ability to perceive meaning by the sense of touch, temperature and pain.

Q(V) Qualitative Visual - ability to perceive meaning through sight.

The qualitative symbols that are programmatic in nature are:

Q(P) Qualitative Proprioceptive - ability to synthesize a number of symbolic mediations into a performance demanding monitoring of a complex task.

Q(PD) Qualitative Proprioceptive Dextral - a predominance of right-eyed, right-handed and right-footed tendencies (a typically right-handed person) while synthesizing a number of symbolic mediations into a performance demanding monitoring of a complex task (e.g., playing a musical instrument, typewriting).

Q(PK) Qualitative Proprioceptive Kinematics - ability to synthesize a number of symbolic mediations into a performance demanding the monitoring of a complex physical activity involving motion.

Q(PS) Qualitative Proprioceptive Sinistral - a predominance of left-eyed, left-handed and left-footed tendencies (a typically left-handed person) while synthesizing a number of symbolic mediations into a performance demanding monitoring of a complex task (e.g., playing a musical instrument, typewriting).

Q(PTM) Qualitative Proprioceptive Temporal - ability to synthesize a number of symbolic mediations into a performance demanding the monitoring of a complex physical activity involving timing.

The remaining ten qualitative symbols associated with cultural codes are defined as:

Q(CEM) Qualitative Code Empathetic - sensitivity to the feelings of others.

Q(CES) Qualitative Code Esthetic - ability to enjoy the beauty of an object or an idea.

Q(CET) Qualitative Code Ethic - commitment to a set of values, a group of principles, obligations and/or duties.

Q(CH) Qualitative Code Histrionic - ability to exhibit a deliberate behavior, or play a role to produce some particular effect on other persons.

Q(CK) Qualitative Code Kinesics - ability to understand, and to communicate by, non-linguistic functions such as facial expressions and motions of the body (e.g., smiles and gestures).

Q(CKH) Qualitative Code Kinesthetic - ability to perform motor skills, or effect muscular coordination according to a recommended, or acceptable, form (e.g., bowling according to form, or golfing).

Q(CP) Qualitative Code Proxemics - ability to judge the physical and social distance that the other person would permit, between oneself and that other person.

Q(CS) Qualitative Code Synnoetics - personal knowledge of oneself.

Q(CT) Qualitative Code Transactional - ability to maintain a positive communicative interaction which significantly influences the goals of the persons involved in that interaction (e.g., salesmanship).

Q(CTM) Qualitative Code Temporal - ability to respond or behave according to time expectations imposed on an activity by members in the role-set associated with that activity.

Witkin and his collegues (Witkin, Dyk, Faterson, Goodenough, and Karp 1962) have developed a perceptual approach to the world in terms of an analytic-active/global-passive dimension. The analytic-active style individual is able to separate items from their irrelevant, embedding contexts. A global-passive style individual reflects a vague, diffused, critical, experiential orientation to surroundings.

Osipow (1969) mentions some of the further work of Witkin and associates as dealing with field dependence and field independence. Field-dependent individuals choose popular occupations requiring considerable involvement with other people and field-dependent students are low in achievement orientation. He further states that field-independent individuals appear cold and distant to others; and tend to be individualistic. Field-dependent individuals make favorable first impressions, are gregarious, affectionate, considerate and tactful.

Research that runs parallel to the work of Witkin and associates has been conducted by Kagan (1966). He states that individuals are often controlled by conceptual tempos; reflective/impulsive. Impulsive individuals select and report solution hypotheses quickly with minimal consideration for their probable accuracy. Reflective learners, of equal intelligence, take more time to decide about the validity of a problem solution. Kagan suggests that the teacher adjust his procedures and tempo of his teaching to accommodate both styles.

Kagan in association with Moss and Sigel (1960, 1963) and Coop and Sigel (1971) refers to three basic cognitive styles - descriptive, relational-contextual, and inferential-categorical which are based on children's and adult's performance on grouping and sorting tasks. The descriptive individual prefers to split the stimuli in his environment into parts and to attend these in units. He differentiates these units in the formation of categorizations. When the descriptive individual is required to group stimuli for purposes of categorization, he tends to base the groupings on an objective attribute shared by all of the stimuli. Any stimulus in the group is an independent instance of the categorization.

The relational-contextual classification is indicated by a preference for characterizing objects in the environment on the basis of a functional relationship that may exist among the objects. In this category no one stimulus can serve as an independent example of the concept; each stimulus must relate to other stimuli in order to be included as a member of the concept.

The inferential-categorical individual chooses to form his categorizations on the basis of inferences made about the stimuli that he groups together. No one attribute is singled out by the individual as a basis of classification.

Cognitive interest styles related to vocational interests have been formulated by Holland (1966) and reported by Johansson (1971). The occupational world is represented by six cognitive styles: realistic, investigative, artistic, social, enterprising and conventional. Each of these six styles is composed of personal qualities that create predispositions for a particular class of vocations. The assumption is that a person enters a vocational field that fits his predisposition and cognitive style.

Johansson reports that the individuals possessing the realistic style have such goals and values as avoiding abstract thought and reading; they prefer agricultural, technical and skilled trades, avoiding supervisory and leadership roles, they like activities that involve motor skills and achieve in technical areas. Occupations typical of this style would be machinist, skilled tradesman and farmers.

The investigative persons prefer vocations of a scientific nature and avoid situations that require social skill and aggressive interaction with others. They like activities involving asocial, analytic, and imaginative behavior. Problems are solved through the manipulation of ideas, words and symbols. Their achievement is apparent in academic and scientific areas and they tend to do poorly as a leader. Physical scientists and engineers would be more representative of this style.

The artistic individuals prefer artistic, musical, literary, and dramatic vocations. They avoid direct relationships with others and avoid strenuous activities but do enjoy creative and imaginative endeavors. Artists, interior decorators, musicians, photographers, actors and writers would be examples of this style.

The social individuals prefer educational, religious and therapeutic vocations. They achieve in areas of leadership, culture and scholarship while avoiding roles requiring motor skills. The occupations of counselor, minister and social worker would fall into this category.

Persons displaying an enterprising style can be persuasive and powerful individuals, with a preference for business roles and activities. They avoid confining activities requiring persistance but achieve in managerial and persuasive areas. Sales managers, salesman and buyers would be characterized in this area.

The conventional style person is one who prefers clerical and computational tasks that are rule orientated, avoiding aggressive outlets. He achieves in occupations of vocational status. This style is prevalent among bankers, business education teachers and accountants.

The assumption could be made that a person possessing certain characteristics of a particular style, according to Holland's theory, should engage in a suitable vocation in that particular style category. Failure of an individual to go into an area of matching styles might indicate a lack of understanding and assessment of the individual on the part of teachers, guidance personnel and administrators. Holland's vocational styles may be a dimension of the entire concept of learning styles.

Dunn and Dunn (1972) suggested that pupils are not presently diagnosed to determine the teaching strategies through which a youngster can learn best. They state that perceptual testing is rarely employed to identify whether a student is a visual, phonetic, tactile or kinesthetic learner. Children are rarely provided with the variety of media that would utilize the most effective learning style for each student.

They suggest that teachers and other members of the instructional team should analyze and determine each youngster's learning style. These are some of the "style" elements which should be checked:

1. Time
2. Schedule
3. Amount of Sound
4. Type of Sound
5. Type of Work Group
6. Amount of Pressure
7. Type of Pressure and Motivation
8. Place
9. Physical Environment and Conditions
10. Type of Assignments
11. Perceptual Strengths and Styles
12. Type of Structure and Evaluation

Guilford (1959) has identified styles which especially may have applicability to vocational-technical education. He states that there are four kinds of intelligence, two of them being called concrete/symbolic. Those abilities involving the use of figural information may be regarded as concrete intelligence. People who depend most upon these abilities deal with concrete things and their properties. People who exhibit concrete/symbolic characteristics are mechanics, operators of machines, engineers (in some aspects of their work), artists and musicians.

Symbolic abilities pertain to abstract intelligence. These abilities are important in learning to recognize words, to spell, and to operate with numbers.

Seagoe (1961) in writing about sensory modalities states:

> In general, appealing to two senses is better than one, to three better than two. We know that visual and auditory stimulation are superior to either one alone, and that visual-auditory-motor stimulation is superior to visual-auditory. . As many sensory approaches as feasible should be used in each learning.

Banks as a part of his review of literature developed a matrix of some of the styles which he felt had applicability to vocational-technical education. The matrix provides information on the various behavioral characteristics for a given learning style and possible instructional modes to accommodate the given style, see Table 2.2. The definitions for each of the style dimensions are:

Learning Style: Consistent patterns of behavior or activity preferred and employed by the individual to effectively and efficiently acquire knowledge, skills and attitudes.

Unstructured: A preferred learning strategy where optimum learning is effected by the individual in an environment that allows for a wide choice of personal selection and involvement in learning activities and objectives where no sequence or form of organization appears.

Structured: A preferred learning strategy where optimum learning is effected by the individual in highly organized environment where the sequence and form of instruction are determined for the student engaging the learner in a passive learning rule.

Concrete: A preferred learning strategy where optimum learning is effected by the individual in an environment that allows the learner to become personally involved with an object or in direct contact with phenomena in "hands on" experience.

Symbolic: A preferred learning strategy where optimum learning is effected by an individual in an environment that allows for a wide variety of mediated, computational, reading or verbal interaction to achieve learning.

Rigid-Inhibited: A learning strategy employed by the learner where learning is effected by the individual due to a tightly closed system for processing information such that both intra and extra personal sources of information are suppressed.

Undisciplined: A learning strategy employed by the learner where learning is effected by the individual's overly sensitive reaction to intrapersonal sources of information. The undisciplined individual has not learned to effectively utilize extrapersonal sources of information.

Acceptance-Anxious: A learning strategy employed by the learner where learning is effected by the individual's tendency to be overly sensitive to extrapersonal sources of information. The acceptance-anxious individual has not learned how to effectively utilize intrapersonal sources of information.

Creative: A learning strategy employed by the individual learner where learning is effected by the learner due to the ability to harmonize and utilize both extrapersonal and intrapersonal sources of information such that maximum utilization can be made in a learning environment.

TABLE 2.2
BEHAVIORAL ACTIVITY CHARACTERISTICS REPRESENTING SELECTED LEARNING STYLES AND POSSIBLE INSTRUCTIONAL MODES TO ACCOMMODATE THE STYLES

LEARNING STYLE DIMENSION	BEHAVIORAL ACTIVITY CHARACTERISTICS REPRESENTING STYLE	RECOMMENDED INSTRUCTIONAL MODES FOR THE STYLE
1.1-Concrete	1.1.1-Likes to deal with objects with "hand-on" activities 1.1.2-Deals directly with Phenomena 1.1.3-Personal Involvement 1.1.4-Employs the use of tools, materials & equipment	1.1.1-Laboratory Activities 1.1.2-Experiments 1.1.3-Group Activity 1.1.4-Object Involvement (Project) 1.1.5-Mediated Tutorial
1.2-Symbolic	1.2.1-Prefers to deal with abstract representation of objects to convey learning.	1.2.1-Computations 1.2.2-Verbal Activity 1.2.3-Mediated Instruction 1.2.4-Language and reading activity
2.1-Structured	2.1.1-Prefers to participate in highly organized activities from simple to complex. 2.1.2-Passive Student Involvement in planning and organizing student activities	2.1.1-Entire course sequence and content specified for the student.
2.2.-Un-Structured	2.2.1-Prefers no definite pattern of classroom organization 2.2.2-Self pacing 2.2.3-Active student involvement in planning and organizing activities 2.2.4-Prefers to "plan" his own activities	2.2.1-Self-guided instruction 2.2.2-Student selection of content and objectives 2.2.3-Self-sequence with few guidelines
3.1-Rigid-Inhibited	3.1.1-Confused in classroom situation-needs continual help 3.1.2-Upset with changes to the point of nervousness 3.1.3-Lacks initiative,unresponsive, hard to get to know 3.1.4-Misinterprets statements & often gives incorrect answers to simple questions	3.1.1-Minimize complexity ambiguity 3.1.2-Reduce alternatives; limit choices 3.1.3-Keep routine consistant and predictable 3.1.4-Supportive teacher, ready to provide structure

TABLE 2.2--continued

LEARNING STYLE DIMENSION	BEHAVIORAL ACTIVITY CHARACTERISTICS REPRESENTING STYLE	RECOMMENDED INSTRUCTIONAL MODES FOR THE STYLE
3.2-Undisciplined	3.2.1-Negativistic-Defiant 3.2.2-Break rules, distructive, antisocial. 3.2.3-Lacks tolerance, shows temper 3.2.4-Disrespectful towards teacher or others	3.2.1-Maximize information about social consequences of behavior 3.2.2-Immediate and intense reinforcement for positive behavior. 3.2.3-Immediate feedback 3.2.4-Recognize social consequences of behavior
3.3-Acceptance-Anxious	3.3.1-Overly Sensitive to criticism and correction 3.3.2-Tries too hard to complete and outdo classmates. Show off 3.3.3-Seeks teacher contact & approval & worries about pleasing others. 3.3.4-Nervous and fearful of failure	3.3.1-Minimize emphasis in external evaluation 3.3.2-Stress self-evaluation 3.3.3-Stress student's ability to make decisions in the learning process. 3.3.4-Challenge confidence
3.4-Creative	3.4.1-Challenged by new ideas, suggestions & problems 3.4.2-Flexible, persistent respectful 3.4.3-Transfers learning from situation to situation 3.4.4-Constructively can assert himself and persistent in solving problems	3.4.1-Provide opportunity for divergent thinking 3.4.2-Provide independent working situations. 3.4.3-Allow for self pacing 3.4.4-Allow for the use of own intuition 3.4.5-Provide for free thought

Research On Learning Styles

Conflicting results have been reported on studies dealing with employing instructional methods which differ in design and use as a function of learner characteristics. Tallmadge and Shearer (1969) studies produced no significant interactions between instructional method and learner characteristic variables, although such relationships have been reported by Stephens & Michels (1965), Edgerton (1958), Snow, Tiffin, and Seibert (1965). Tallmadge and Shearer (1971) did report a statistically significant interactive relationship between learner anxiety and method of instruction which was consistent across two subject matter areas and two types of learning situations.

Davis, Marzocco and Denny (1970) report that a number of studies suggest the possibility that individual difference measures may be useful for prescribing instructional treatments - Doty and Doty (1964), Lublin (1965), Schoer (1966), Stolurow (1964) and Traweek (1964).

Many different learning styles have been identified by different authors and each of these has a differing effect upon student learning. Coop and Brown (1970) report that:

> "The results of recent studies using the Kagan group's concept of style in a bicategorical system, analytic style versus non-analytic style, present a composite picture of these two style dimensions. Subjects who have been found to be analytic on the cognitive style test appear set to attend to more factual detail during concept acquisition (Kagan et al., 1963); are superior to the individuals who are nonanalytic on the style test in learning concepts based on objective similarity of detail among visual stimuli (Lee, Kagan, & Rabson, 1963); and score higher on performance tests than on verbal tests (Kagan, Rosman, Day, Albert, & Phillips, (1964). Conversely, the individuals who have been found to be non-analytic on the cognitive style test score better on verbal tests than on performance tests; learn functional relationships better than the persons who were analytic on the style test; and tend to be more impulsive than the analytic individual on tests of conceptual tempo (Kagan et al., 1963; Kagan et al., 1964). There does not, however, appear to be a significant difference between these two style categories in terms of total IQ scores."

> "Beller (1967) has already demonstrated that a specific teaching method can be designed to facilitate the learning of nursery school children in associating words with objects when the cognitive styles of these children are identified and used to assign the children to teaching methods which are consonant with their stylistic preferences. Beller's teaching methods were highly individualized and involved predominantly a one-to-

one teacher-pupil ratio, however."

> "A study by Siegel and Siegel (1965), using a different style construct, also suggests that learners with certain cognitive styles are either facilitated or hampered by the particular teaching methods to which they are exposed. The Siegel study further suggests that cognitive style not only operates to influence how well a student learns, but also what kind of content the learner chooses to attend to and what content he would rather ignore or get out of the way as fast as possible."

Frederick and Klausmeier (1970) allude to differences in students' perceptions of situations around them. They state:

> ...teachers report that students perceive the same task differently, that some students comprehend situations better through discussion than by reading and independent study, that some are able to analyze and evaluate information readily in arriving at concepts and principles inductively and others are not. Thus, differences among students in styles of perceiving, cognizing, and conceptualizing are probably as real as are differences in general intellectual ability and educational achievements.

Jerome Bruner deals with learning style in an indirect way. He does not specifically call it style, but appears to be aware of its existence along with related themes of learning. Bruner's early themes dealt with:

1. The role of structure in learning and how it may be made central to teaching.

2. Readiness for learning.

3. The nature of intuition - the training of hunches.

4. The desire to learn and how it may be stimulated. Interest in material to be learned is the best stimulus to learning (Bruner, 1961).

Later writings by Bruner (1966) suggested that the will to learn may become a problem. This may occur in situations where the curriculum is set, students are confined, and their path is fixed. This problem exists, not so much in learning itself, but in the fact that what the school imposes often fails to enlist the natural energies of the student. These energies include curiosity, a desire for competence, aspiration to emulate a model, and a deep sense of commitment to the need of social reciprocity.

Bruner is concerned that as each child develops he/she has certain characteristics of viewing the world and explaining it to himself. The task then is to teach a subject to a child, representing the structure of that subject, in terms of the child's way of viewing things. It is important in education to reflect not only the nature of the knower but also the knowledge getting process. Knowing is a process, and not a product (Bruner, 1966).

Bruner's statements lead one to believe that he is concerned about a child's learning style. He suggests that education should provide aids and dialogues for translating experience into the learner's way of attempting to solve a problem.

Along the lines of Bruner's theories, an awareness of learning style is evident in the Individually Prescribed Instruction programs. The individually Prescribed Instruction program is based on the premise that children have a variety of learning styles. Some may need manipulative materials to work with while others function well in small groups or benefit greatly from special projects. Others may need more practice on specific skills or opportunities to apply learned skills to new instructions (Scanlon, 1972, and Byram and Larson, 1972).

Davis and Klausmeier (1970) found that one's cognitive style significantly influences concept-identification performance. High analytic subjects committed fewer errors in identifying the concepts of the study than did low analytic subjects.

Emmer, Good, and Oakland (1971) in a study of feedback expectancy on choice of teaching styles found that preference for a teaching style can be influenced by the type of feedback the teacher expects to receive.

Most learning styles studies have been limited -- not only in scope but also to the what and how of concept attainment. Hill (1971b) points this out as he states:

> Turning to the consideration of investigations of cognitive behaviors, the traditional approaches in these endeavors have dealt mainly with concept formation. These types of studies have tended to be limited to such considerations as: what are concepts? how are they attained? or, how are they learned? In essence, these efforts have been directed toward investigations of various ramifications of what might be termed "concept learning." Investigators involved in these types of studies, however, have not examined cognitive functions in the context of personality.
>
> During the past ten to fifteen years, the concept of cognitive style has been investigated in the context of cognition as a facet of personality. Witkin,

> for example, has advanced the notion that the phenomenon described as cognitive style is a type of personality construct expressed in the interaction between perceptual (cognitive) response systems and antecedent conditions in the life history of the subject (person). In this context, then, the investigator is interested in such phenomena as the quality of mother-child relationships as antecedents to certain types of cognitive styles.
>
> Certain contemporary studies of cognitive style have been designed to consider the phenomenon as an individual's particular mode of response to a given set of stimuli (variables). Other modern efforts have sought antecedents, or correlates, between cognitive style and: (1) such personality variables as: dependency, anxiety, and passivity; (2) such cognitive variables as: intelligence, problem-solving, and reasoning; and (3) such psychological processes as: learning, and perception. In essence, then, the contemporary studies of cognitive style involve the investigation of cognitive processes in the context of personality and defined social variables. These approaches indicate the recognition on the part of certain psychologists (e.g., Broverman, Gardner, Kagan, Moss, Sigel, Witkin) that cognitive behaviors form a fundamental part of a socio-personal matrix, and that the employment of certain classes of behavior called "cognitive" have qualities which justify their being defined as stylistic.

Hill (1971b) further states that the cognitive style of an individual can be changed. He states:

> The cognitive style of an individual can be changed by the process of training and education. A cognitive style is considered to be changed at the training level of development when the individual exhibits behavior (e.g., responses to certain test variables, demonstration of certain physical actions) of his having acquired at least one or more elements in at least one of the sub-sets comprising his cognitive style.

Styles Which Affect Teaching and Learning

Very early in the project it became apparent that the Learning Styles Project as outlined in the Phase I proposal was too limited. Not only would the styles of students need to be considered but also the styles of teachers, counselors, administrators, and even those of curricular materials. Hill, Nunney, and Orr (1971) have identified other styles which affect teaching and learning. These are:

1. Learning Styles of the Students

2. Teaching Style of the Teachers

   A. Predominant
   B. Adjustive or "Switcher"
   C. Flexible

3. Counseling Style of Counselors

   A. Directive
   B. Situational
   C. Non-directive

4. Administrative Style Persons - Processes - Properties

   A. Dominant (My goals my way)
   B. Adjustive (My goals my way or your goals my way)
   C. Cooperative (Our goals our way)
   D. Passive Custodial (Your goals your way)

5. Style of the Curricular Materials

   A. Textbooks (compare, contrast, analyse, synthesize, etc.)
   B. Media
   C. Individualized Units

Unless an effort is made to match student, teacher, and curricular materials styles, the whole thrust of the project may be inappropriately guided to a non-successful conclusion.

Summary of the Review of Related Literature on Learning Styles

1. A multitude of learning styles have been identified in the literature.

2. Each student has his own learning style or way of seeking knowledge, skills, and attitudes.

3. There are differences among students in styles of perceiving, cognizing, and conceptualizing.

4. Students have a variety of learning styles which necessitates a variety of alternative forms of learning to meet a given style.

5. Cognitive style or learning style is not a single concept or construct but rather a composite of a whole host of factors each of which interact with each other. Of these constructs

personality, cognitive and psychological are very important.

6. Learners with certain cognitive styles are either facilitated or hampered by the particular teaching method to which they are exposed.

7. An interactive relationship has been shown between learner anxiety and the method of instruction.

8. There is a relationship between instructional methods and learner characteristics.

9. Individual differences of pupils are useful for prescribing instructional treatments.

10. Subjects who have been found to be analytic on the cognitive style test:

    A. Attend to more factual details during concept acquisition,

    B. Are superior to non-analytic individuals in learning concepts based on objective similarity of detail among visual stimuli, and

    C. Score higher on performance tests than on verbal tests.

11. Individuals who have been found to be non-analytic on the cognitive style test:

    A. Score better on verbal tests than on performance tests,

    B. Learn functional relationships better than the persons who were analytic on the style test, and

    C. Tend to be more impulsive than the analytic individual on tests of conceptual tempo.

12. Cognitive style influences the kind of content the learner chooses to attend to and the content he would rather ignore or get out of the way as fast as possible.

13. No single learning style element used by itself is sufficient to determine a student's composite style or map of the diverse ways in which he may seek meaning.

14. The information gathered via the "composite picture" of learning styles can be used to write learning prescriptions

to optimally facilitate an individualized instruction program.

15. A system exists at Oakland Community College in Bloomfield Hills Michigan whereby a composite picture of a student's learning style can be assessed via a battery of inventories. Three sets of elements (symbolic mediation, cultural determinants and modalities of inference) comprise the cognitive style of the individual. This is the most comprehensive system devised to date using most of the style elements listed in this chapter to obtain a "map" of the student's learning style.

16. Occupational interest cognitive styles have been formulated by Holland and these have application for counselors.

17. Teachers have a style which affects teaching and learning.

18. Counselors have a style which affects their effectiveness as a counselor.

19. Curricular materials have styles which affect learning.

20. The cognitive style of an individual can be changed by the process of training and education.

21. Multiple sensory approaches to teaching and learning are superior to singular modality approaches.

CHAPTER III

METHODOLOGY AND PROCEDURES

The methodology for the project is listed in this Chapter in relation to each of the major project objectives. Obviously many more activities and procedures were carried out than listed under the objectives. The total sequential project procedures are contained in Tables 3.3 and 3.4 which follow the initial discussion.

The extent of meeting each of the project objectives is shown in Table 3.1. The first six objectives were fully met during Phase I while the last three were partially met. The project will concentrate on Objectives 7-9 during Phase II at which time it is hoped these latter three objectives will be met.

Methodology and Procedures by Objective

1. To identify learning styles relevant to vocational-technical programs.

   A comprehensive review of literature on learning styles relevant to vocational-technical programs was completed by John Banks, Graduate Assistant, University of Wisconsin-Stout and by the Project Director. A matrix of the different learning styles was prepared in addition to a report which discussed each of these learning styles.

2. To develop instruments to measure students' learning styles.

   Two different types of instruments (Likert and semantic differential) were prepared by Banks to measure the dimensions of concrete/symbolic and structured/unstructured learning styles of the Fox Valley Technical Institute Students.

Instrument Design and Scoring

In designing the instruments the dimension of concrete to symbolic formed a continuum from highly concrete to highly symbolic. Statements on the instrument were developed to reflect various positions or levels between continuum ends. The dimension of structured to unstructured was developed in the same manner.

On the Likert pilot instrument respondents were asked to react to the statement according to the following scale:

1 - Of No Value
2 - Somewhat Valuable
3 - Of Average Value
4 - Very Valuable
5 - Extremely Valuable

TABLE 3.1

OBJECTIVES FOR PHASE I AND THE EXTENT TO WHICH THEY HAVE BEEN MET

Learning Styles Objectives Phase I	Extent of Meeting the Objectives		
	Fully Met	Partially Met	Never Met
1. To identify learning styles relevant to vocational-technical programs.	X		
2. To develop instruments to measure a student's learning style(s).	X		
3. To develop instruments to identify the characteristics of learning materials and modes of instruction.	X		
4. To develop an ideal individualized learning model.	X		
5. To validate and evaluate the ideal individualized learning model via a jury of experts.	X		
6. To construct alternative learning experiences using the model based on each style of learning.	X		
7. To determine the interaction between learning styles and the characteristics of learning experiences and modes of instruction.		X	
8. To develop a computer based management system to determine the type of learning experiences appropriate for the student.		X	
9. To construct an information system to provide feedback to teachers on the progress of their students and to suggest alternate experiences for the students.		X	

Positive valence items were scored using a value of 1 to 5. If the respondent thought a concrete or structured item was extremely valuable to him in a learning situation that item was scored a value of 5. Conversely if the respondent thought a symbolic or unstructured item was extremely valuable to him in a learning situation that item was scored a value of 1. Negative valence items were scored using a value of 5 to 1. A high concrete score of 50 was possible providing the respondent thought the concrete items were extremely valuable while stating that the symbolic items were of no value to him in a learning situation. Conversely the highly symbolic individual could score a low of 10 which would be the reverse of the concrete style. This also applied to the structured/unstructured dimension. The continuum had a value range of 10 to 50. The lower the raw score of the individual, or the closer the number appeared to 10 the more symbolic or unstructured the individual viewed himself in a learning situation. The larger or closer the number appeared to 50 the more concrete or structured the individual appeared in a learning situation. The continuum mid-point was determined to be 30. This is the point at which an individual could have responded to all 10 continuum items by stating they were of average value in a learning situation. The continuum midpoint could also be achieved by an assortment or mix of the response values. This may indicate that one is not directly influenced by any one style on a continuum or that he prefers a mix of styles.

The semantic differential was developed in a format similar to the Likert scale. Five statements were developed to measure the same four learning style dimensions. Each statement allowed for five responses and the value scale was between a low of one to a high of seven.

Questions one to ten formed a continuum between concrete/symbolic with a low value of 50 appearing for highly symbolic to a high value of 350 appearing for highly concrete responses. The value was determined by assigning a valence to the adjectives appearing on the right side of the instrument. The valence for the concrete and structured items was as follows:

easy - positive
confusing - negative
meaningless - negative
interesting - positive
worthless - negative

Symbolic and unstructured items were given an opposite value.

Positive items were thus scored on a scale of one to seven and negative valence items were scored on a value scale of seven to one. This was done to again provide two raw scores, one for each continuum. The higher or larger the raw score the more concrete or structured the

individual, while the lower the raw score the more symbolic or unstructured the learner.

Instruments were assembled and forwarded to the project director at Fox Valley Technical Institute in Appleton, Wisconsin for his evaluation and suggestions. Some modifications in the instruments were made and both were duplicated and assembled. A date was arranged for the pilot administration of both instruments to a selected group of students enrolled at Fox Valley Technical Institute.

A weighted score analysis program was developed to provide data on the pilot administration of the instrument. Hoyt's analysis of variance formula was used to compute instrument reliability.

Pilot Administration

A group of 98 students at Fox Valley Technical Institute participated in the pilot administration of the instruments. All students completed the semantic differential and Likert attitude instrument. Males and females enrolled in such diverse programs as child care, audio visual tutorial typing, accounting and automobile technology participated in the pilot administration.

It was determined by the project personnel and consultants that the above groups reflected characteristics specifically related to the learning style variables investigated. It was hypothesized that individuals who chose a program of study did so because they had a compatible learning style with that program.

The pilot administration was conducted to determine the instruments effectiveness, obtain student reactions to the directions, assess ease of understanding the statements and aid in determining if additional revisions were needed.

Based on the results of the pilot administration it was determined to discontinue the use of the semantic differential scale and to revise the Likert attitude scale. By comparing the data accumulated on both instruments it was determined that similar variables were being measured. Since the Likert was more efficient to use, it was selected for this study.

Revisions to the Likert instrument were made to improve reliability and to incorporate suggestions that participants offered during the pilot administration.

Pilot Instrument Reliability

Reliability coefficients were determined for the pilot instrument by applying Hoyt's analysis of variance method. The reliability coefficients for the Likert instrument were .29 on the concrete/symbolic

dimensions and .80 on the structured/unstructured dimensions. Since the semantic differential was not used in the final administration, its' coefficients were not reported.

Final Instrument Administration

The final instrument was enlarged by two statements which necessitated a change in the computer program. One statement was added to each continuum therefore increasing the continuum range from a low of 11 for the symbolic and unstructured dimensions to a high of 55 for the concrete and structured dimensions. No changes in the method of scoring the final instrument were made. (See Appendix A for a copy of the final instrument).

Arrangements were made on the campus of the University of Wisconsin - Stout to administer the instrument to groups of art and psychology majors. It was anticipated that these groups could offer some valuable data in the area of symbolic and unstructured learning styles. This group consisted of a total of 57 individuals who had made definite commitments to the above programs of studies.

The final administration was conducted at Fox Valley Technical Institute with 140 students participating.

The program areas surveyed were:

1. Machine Tool IV
2. Machine Shop II
3. Mechanical Design IV
4. Mechanical Design II
5. Industrial Drafting II
6. Auto Body Repair IV
7. Electronics Technology IV
8. Conservation IV

These groups were selected on the basis of learning styles assumed to be evident in various programs. Students were engaged in one and two year vocational diploma programs and two year associate degree programs.

Participants were provided an instrument booklet, pencil and IBM 1230 Document No. 506 for recording their reactions. Each individual was assigned an identification number before the response sheets were supplied to the computer. A weighted scores analysis program was applied to summarize the data from the various groups.

Final Instrument Reliability

The final instrument reliability coefficients for the two learning styles dimensions are contained in Table 3.2. The reliability co-

TABLE 3.2

RELIABILITY COEFFICIENTS FOR EACH LEARNING STYLE DIMENSION OF THE GROUPS TESTED

Group	Reliability Coefficients	
	Concrete/ Symbolic	Structured/ Unstructured
Drawing 500	.35*	.85*
Life Drawing	.00*	.72*
Psychology	.00	.85
Machine Tool IV	.04	.83
Machine Shop II	.00	.60
Machine Design IV	.59	.82
Machine Design II	.29	.77
Industrial Drafting II	.00	.58
Auto Body IV	.01	.76
Electronics Technology IV	.01	.81
Conservation IV	.27	.82
Total Group	.22**	.81**

*Reliability coefficients calculated separately from remaining groups.
**Total group reliability coefficients do not include art groups.

efficient for the total groups on the concrete/symbolic dimension decreased seven hundreds of a point from the coefficient attained in the pilot administration. Final reliability was determined to be ≠ .22. Two possible explanations exist for the low coefficient: (1) a symbolic instrument was designed to measure the concrete/symbolic continuum; thus, a negative attitude may exist in an individual possessing a concrete style and; (2) some other variables may exist in the statements used to measure the continuum such as attitude toward the teacher and teaching style, which affect instrument reliability. The reliability coefficient for the structured/unstructured dimensions for the total group increased slightly from the pilot administration, see Table 3.2.

FVTI Instrumentation

In addition to the University of Wisconsin-Stout instrument, a comprehensive student survey was prepared by the Project Director and administered to 581 randomly selected students at Fox Valley Technical Institute. The survey was divided into four parts which were:

a. The Generalized Situational Choice Inventory*

b. The Human Trait Inventory*

c. Individualized Learning Attitude Scale, and

d. Individualized Learning Student Opinionnaire

Due to the length of the instrument, classes were randomly assigned a one or a two to indicate which half of the survey each class would complete. Completing Part one was 314 students while 267 students completed Part two.

A copy of the survey instrument and a complete summary of the findings are contained in the final report entitled, "Student Survey."

3. To develop instruments to identify the characteristics of learning materials and modes of instruction.

An instrument was prepared and administered to those faculty who had idividualized a course or program at Fox Valley Technical Institute to identify their attitude toward individualized instruction, and the characteristics of learning

*These two parts of the survey were adapted from scales developed by Farquhar (1961) of Michigan State University.

materials and modes of instruction. In addition a comprehensive faculty interview instrument was prepared and a random sample of the faculty who had individualized were personally interviewed to identify the characteristics of learning materials and modes of instruction. Copies of these instruments and a complete summary of findings are contained in the final reports as listed in the Learning Styles Project Bibliography.

4. To develop an ideal individualized learning model.

The data from the review of literature and from the many surveys were analyzed and synthesized and used to modify previously developed models by the project director for the individualization of instruction.

Two separate models and accompanying guidelines were prepared for use by the Fox Valley Technical Institute staff. One model and guidelines was for materials development in an individualized setting while the other model and guidelines was for the actual individualization of instruction in a classroom setting. The latter model provided for the diagnostic testing of students to identify their learning style, the writing of prescriptions for modes of learning, and alternative forms of learning to meet a given objective.

(Limited copies of these models and guidelines are available upon request.)

5. To validate and evaluate the ideal individualized learning model via a jury of experts.

Dr. Joe Hill, President and Dr. Derek Nunney, Vice President of Oakland Community College evaluated the model and made several suggestions for its improvement. These suggestions only resulted in the combining of several steps via feedback loops and did not change the basic design.

An evaluation of the models and accompanying materials by the FVTI teachers indicated that the models were useful, that they have implications for individualized course and program development, and that these materials should be made available to the rest of the Fox Valley Technical Institute staff via similar workshops.

6. To construct alternative learning experiences based on each style of learning for several sets of objectives.

The ideal models for the development of learning materials and for the individualization of instruction were used to

guide FVTI teachers in the development of alternative learning experiences for meeting a given objective. Based upon these models, 18 vocational-technical teachers from FVTI were trained in a workshop from June 11-14, 1973 on the construction of alternative learning experiences. These teachers have developed alternative learning experiences for a segment of their teaching and will pilot test these materials during the 1973-74 school year. The program areas represented include:

Agri-Business	Graphics
Automotive	Interior Decoration
Conservation	Marketing
Data-Processing	Metals
Drafting	Social Studies
Electronics	

7. To determine the interaction between learning styles and the characteristics of learning experiences and modes of instruction.

   The different research activities conducted by UW-Stout and FVTI emphasize the interaction between learning styles and the characteristics of learning experiences and modes of instruction. A complete summary of these findings are contained in the different research reports. The primary purpose of Phase II is to further test this objective.

8. To develop a computer-based management system to determine the type of learning experience appropriate for the student.

   The different variables for a computer-based management system have been identified, however, it was found that with the present funding and staffing it was impossible to complete this computer-based management system during Phase I. A copyrighted computer-based management system was identified and has direct applicability to this project. The owners of this program at Oakland Community College in Bloomfield Hills, Michigan, have agreed to analyze FVTI data with their system at the present time until we are able to either (a) develop our own system, or (b) adapt their system to meet our needs.

9. To construct an information system to provide feedback to teachers on the progress of their students and to suggest alternate learning experiences for the students.

   A comprehensive proto-type information system is being developed on a consultant basis by FVTI computer programmers. The variables for this comprehensive system were identified by two FVTI staff members from Communications Skills who were hired on a consultant basis during June, 1973. Their proto-

type system will be experimented with during the 1973-74 school year by the Communications Skills Department. Whenever this system is debugged and can prove its worth, it will be expanded to other departments at FVTI.

Phase I Activities And Time Schedule

All major activities conducted during Phase I of the learning styles project are contained in Tables 3.3 and 3.4. Table 3.3 contains the project activities conducted at FVTI while Table 3.4 contains the activities conducted by the University of Wisconsin-Stout subcontract personnel. It can be noted in Table 3.3 that most activities were conducted behind schedule which was due to the lateness of starting the project.

TABLE 3.3
LEARNING STYLES PROJECT
ACTIVITIES AND TIME SCHEDULE
PHASE I
July 1, 1972 - June 30, 1973

Activity	Time Schedule For Completion	Activity Begun	Instruments and/or Reports Prepared	Activity Completed
1. Identify personnel for the project,	July 1972	Oct. 1972		Nov. 1972
2. Identify cognitive, affective, and psychomotor variables that influence learning. (Review of literature).	July-Sept. 1972	Nov. 1972		Jan. 1973
3. Determine the patterns in which these variables are found. (Identify learning styles).	July-Sept. 1972	Nov. 1972	Matrix Chart Prepared	Jan. 1973
4. Meet with the faculty of the different departments to become acquainted with the activities of each.	Nov. 1972	Nov. 1972		Dec. 1972
5. Evaluate the individualized instruction units of selected faculty.	Nov.-Dec. 1972	Nov. 1972		Jan. 1973
6. Personally interview selected faculty and students to identify possible areas of strengths and weaknesses of individualized instruction.	Nov.-Dec. 1972	Nov. 1972		Dec. 1972
7. Develop procedures and instruments to identify the characteristics of learning materials, experiences, and environment.	Oct.-Nov. 1972	Dec. 1972	Instrument Prepared	June 1973
8. Select and/or develop instruments to assess students' preferred learning styles.	Oct.-Nov. 1972	Jan. 1973	Instrument Prepared	March 1973
9. Develop procedures for analyzing and reporting the data gathered on students' learning styles to instructors for use in decisions on instructional modes.	Nov.-Dec. 1972	Nov. 1972 Jan. 1973	Procedures Identified	Jan. 1973
10. Pilot the instruments and system developed in Activities 7,8, and 9.	Jan. 1973	April 1973		May 1973
11. Consult with psychologists and learning specialists at the University of Illinois.	Dec. 1972	Dec. 1972	Report Prepared	Dec. 1972

TABLE 3.3--(continued)

Activity	Time Schedule For Completion	Activity Begun	Instruments and/or Reports Prepared	Activity Completed
12. Meet with UW-Stout and State personnel regarding project and subcontract.	Dec. 1972	Dec. 1972	Subcontract Prepared	June 1973
13. Develop an evaluation design for the remainder of Phase I and for Phase II.	Jan. 1973	Jan. 1973	Evaluation Report	March 1973
14. Explain the Learning Styles Project to the FVTI Faculty Association.	Nov. 1972	Nov. 1972		Dec. 1973
15. Form and meet with a student and faculty sounding board/Advisory committee.	Dec. 1972	Jan. 1973		May 1973
16. Hire several teachers as consultants to identify the variables for a management information system.	March1973	Feb. 1973		June 1973
17. Hire Dr. Jerry Walker, Director of Evaluation, Center for Vocational-Technical Education, The Ohio State University, to consult with the project personnel on an evaluation design for the remainder of Phase I and for Phase II.	Mar. 1973	Mar. 1973	Report Prepared	March 1973
18. Contact Waukesha County Technical Institute to solicit their participation with the project.	Mar. 1973	Mar. 1973		March 1973
19. Recruit staff to participate in Phase II of the project.	March1973	Mar. 1973		April 1973
20. Hire computer programmers to develop the management information system.	Mar. 1973	Mar. 1973	System Developed	June 1973
21. Visit Waukesha County Technical Institute to review the Learning Styles Project and to formulate plans for a cooperative research effort during Phase II.	May 1973	May 1973		June 1973

TABLE 3.3--(continued)

Activity	Time Schedule For Completion	Activity Begun	Instruments and/or Reports Prepared	Activity Completed
22. Select staff to develop alternative learning experiences.	May 1973	May 1973		June 1973
23. Complete the following individualized instruction surveys. A. Student Survey B. Faculty Survey C. Supervisory Survey	May 1973	April 1973	Three Reports Prepared	May 1973
24. Personally interview selected faculty concerning individualized instruction.	May 1973	April 1973	Report Prepared	May 1973
25. Attend conference on the Personalization of Educational Programs Utilizing Cognitive Styles Mapping.	May 1973	May 1973		May 1973
26. Develop an ideal model for the individualization of instruction.	June 1973	May 1973	Model Prepared	June 1973
27. Develop materials to assist the FVTI pilot test staff in implementing the ideal model for the individualization of instruction.	June 1973	May 1973	Materials Prepared	June 1973
28. Develop computer programs for analyzing data from study. (Analysis of the influence on learning.)	Feb.-May 1973	May 1973	Program Prepared	June 1973
29. Analyze results of Phase I of study.	April-June 1973	May 1973	Five Reports Generated	June 1973
30. Conduct a workshop to orient the staff to the ideal model for individualized learning and to assist them in the development of alternative learning experiences and modes of instruction to meet a given educational objective.	June 1973	June 1973		June 1973
31. Construct alternative learning experiences and modes of instruction based on each learning style.	May 15-June 30, 1973.	June 1973		July 1973
32. Write interim report. (For Phase I).	June 1973	June 1973	Report Prepared	July 1973

TABLE 3.4

UW-STOUT SUBCONTRACT

ACTIVITIES AND TIME SCHEDULE

PHASE I

Activity	Time Schedule
1. Identify learning styles	August 28, 1972 - January 15, 1973
2. Select subset of learning styles for investigation.	January 15, 1973 - January 31, 1973
3. Design student reaction instrument to measure their perception of the relationship of the dimensions in these selected learning styles to learning rates.	January 20, 1973 - February 2, 1973
4. Administer the students' reaction instrument and analyze the data.	February 5, 1973 - February 9, 1973
5. Develop computer programs to manage the learning style data for use in making instructional decisions and evaluations.	January 8, 1973 - January 31, 1973
6. Design instruments to quantitatively measure the selected learning styles.	February 5, 1973 - February 23, 1973
7. Identify learning activities with instructional modes parallel to the selected learning styles.	February 19, 1973 - March 2, 1973
8. Select a group of students heterogeneous on the basis of the selected learning styles.	March 5, 1973 - March 9, 1973
9. Measure the performance of the selected students on their various instructional modes. Also, acquire information on the characteristics of the students (i.e. I.Q., interests, etc.).	March 1. 1973 - April 30, 1973
10. Analyze data. Correlate the learning styles with performance.	May 1, 1973 - May 18, 1973
11. Develop report of the results and draw implications for second phase of the project.	May 21, 1973 - June 30, 1973

CHAPTER IV

ANALYSIS OF THE DATA

A partial analysis of the data is presented in this chapter. For a complete analysis the reader is referred to the separate reports listed in the Learning Styles Project Bibliography. The chapter is divided into three parts. Part I contains a partial analysis of the data gathered and analyzed by the subcontractors. Part II contains the data gathered via the Student Survey at Fox Valley Technical Institute. Part III contains data from the Fox Valley Technical Institute Teacher Survey.

Part I - University of Wisconsin-Stout Subcontract Data

As indicated in Chapter III 140 Fox Valley Technical Institute students in eight program areas completed the survey in addition to students from three program areas of UW-Stout.

Concrete/Symbolic Data Analysis

The item analysis of the concrete/symbolic learning style dimensions of the students surveyed is contained in Table 4.1. This table includes data from all groups except the two art groups from the University of Wisconsin-Stout campus.

Items 1-6 were developed to measure the concrete dimension and items 7-11 were developed to measure the symbolic dimension. Once again it is emphasized that a continuum was formed with the highly concrete end designated as having a value of 55 and the symbolic or low end of the continuum having a value of 11. These values were determined by an individual's response to the various statements and compilation of data based on the valence. The concrete items held a positive valence and the symbolic items held a negative valence.

A highly concrete individual attaining a maximum score of 55 would have accepted items 1-6 at the "Extremely Valuable" end and would have rejected symbolic items 7-11. Negative valence items 7-11 were scored using reverse values of 5-4-3-2-1. Likewise an individual possessing a highly symbolic style would have replied to the previous items in an opposite manner. The eleven items were designed to measure the continuum defined by concrete at one pole and symbolic at the other pole. An individual's position on the continuum depends on his acceptance or rejection of the value of the learning experience defined in each statement on the instrument. Location towards the end of the continuum indicates a high influence by that style while location towards the midpoint indicates a desire for a mix of learning styles.

The data contained in Table 4.1 provide the reader with the total group response pattern for the concrete/symbolic learning style dimensions. It must be recalled, when viewing the Table, that items 7-11 have a negative valence. Disagreement with these items results in higher concrete scores. A mean of 2 indicates that the average response for that item is two. But calculating the individual's total score, this response would receive 4 points. A mean value of 2 on items 7-11 would score as a value of 4 which would be interpreted as a rejection of the symbolic items and an acceptance of the concrete items.

Items one and six hold a mean value of over four while items 2-5, eight and 11 had values of three or more. Items seven, nine and ten had a mean value between two and three.

Frequency Distribution Of The Concrete/Symbolic Dimensions

The frequency distribution of mean scores of the students on the concrete/symbolic learning styles dimensions is shown in Tables 4.2 and 4.3.

The art groups (Table 4.2) tended toward the concrete end of the continuum. This was statistically determined by a mean score of 38.61 and by visual analysis of the frequency distribution. One individual attained a value below the midpoint while the thirty-five remaining individual scores ranged from the midpoint up to the high of 45.

Due to the fact that calculations for the art groups were conducted separately, the remaining groups are depicted in Table 4.3. This distribution reflects the scores of all of the individuals in the psychology groups on the Stout campus and the participants from the Fox Valley Technical Institute Campus. A mean of 38.30 was attained for this group indicating a tendency toward the concrete end of the continuum. The standard deviation and range of scores suggest a variety of concrete/symbolic learning styles were present in the groups tested. Few individuals attained a value below the midpoint of 33. A large number of individuals scored above 43 on the continuum which indicates that these individuals tended to exhibit a high concrete learning style.

Group Comparisons of the Concrete/Symbolic Dimensions

A visual comparison of the mean scores achieved by each group on the concrete/symbolic scale is shown by Figures 4.1 and 4.2. The two art groups are shown separately as the data were computed before the instrument was administered to the remaining nine groups of participants. All groups measured tended to view themselves as emphasizing a concrete learning style dimension which allows the learner to become personally and actively involved with an object or in direct contact with phenomena.

TABLE 4.1

ITEM ANALYSIS OF THE CONCRETE/SYMBOLIC LEARNING STYLE DIMENSIONS OF THE STUDENTS SURVEYED

Item	Percentage of Response/Item 1	2	3	4	5	Mean	Stan.Dev.	P-Cor	Q_1	Q_2	Q_3	I.Q.R.
1	0.011	0.040	0.064	0.350	0.532	4.350	0.861	0.480	3.879	4.560	5.030	1.151
2	0.000	0.076	0.309	0.409	0.204	3.742	0.867	0.168	3.061	3.778	4.389	1.327
3	0.029	0.146	0.368	0.327	0.128	3.380	0.980	0.309	2.702	3.380	4.129	1.427
4	0.011	0.064	0.233	0.397	0.292	3.894	0.936	0.436	3.243	3.977	4.645	1.401
5	0.017	0.140	0.502	0.239	0.099	3.263	0.882	0.085	2.683	3.180	3.871	1.188
6	0.000	0.040	0.169	0.391	0.397	4.146	0.842	0.277	3.600	4.238	4.871	1.270
7	0.140	0.426	0.304	0.087	0.035	2.447	0.958	0.426	1.753	2.335	3.086	1.333
8	0.052	0.099	0.374	0.321	0.152	3.421	1.030	0.344	2.761	3.429	4.195	1.433
9	0.076	0.274	0.345	0.245	0.058	2.935	1.026	0.210	2.132	2.932	3.720	1.587
10	0.274	0.368	0.274	0.064	0.017	2.181	0.965	0.458	1.409	2.111	2.888	1.478
11	0.011	0.169	0.292	0.403	0.116	3.447	0.945	0.508	2.730	3.557	4.173	1.443

Note: Does not include item analysis data from Life Drawing and Drawing 500 groups.

TABLE 4.2

FREQUENCY DISTRIBUTION OF THE ART GROUP
ON THE CONCRETE/SYMBOLIC LEARNING
STYLE DIMENSIONS

Mean Score	Frequency Distribution
45	*
44	*
43	* * *
42	*
41	*
40	* * * *
39	* *
38	* * * * * *
37	
36	
35	* * *
34	*
33	* * ---------Concrete/Symbolic Continuum Midpoint
32	*
31	
30	

N = 26 $\quad \overline{X} = 38.61$

TABLE 4.3

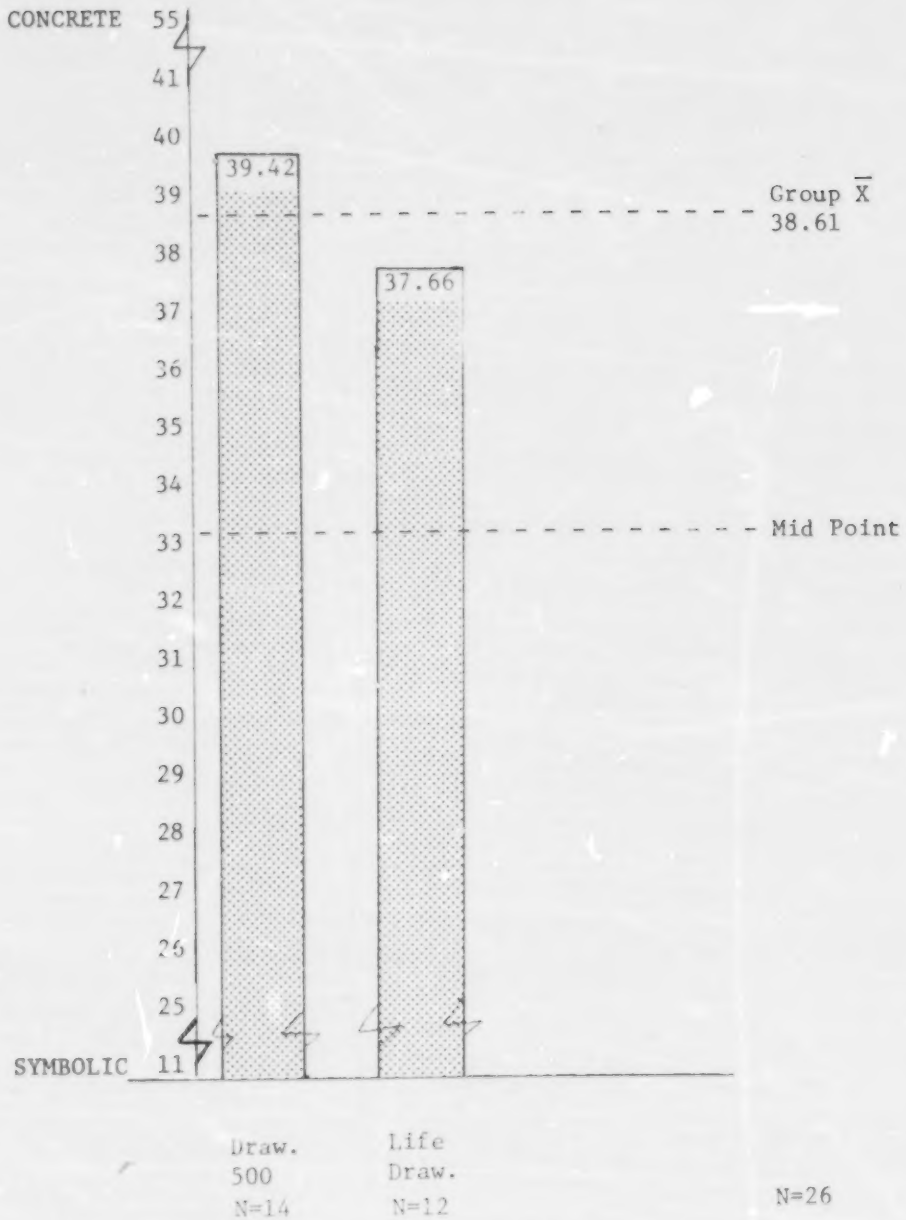
FREQUENCY DISTRIBUTION ON THE CONCRETE/
SYMBOLIC LEARNING STYLE DIMENSIONS
OF THE TOTAL GROUP SURVEYED

Mean Score	Frequency Distribution
48	*
47	*
46	* * *
45	* * * *
44	* * *
43	* * * * * * * * * *
42	* * * * * * * * * *
41	* * * * * * * * * * * *
40	* * * * * * * * * * * * * * * * * * * *
39	* * * * * * * * * * * * * *
38	* *
37	* *
36	* *
35	* * * * * * * * * * * * * * *
34	* * * * *
33	* * * * * * * * * *----Concrete/Symbolic Continuum Midpoint
32	* *
31	* *
30	*
29	*

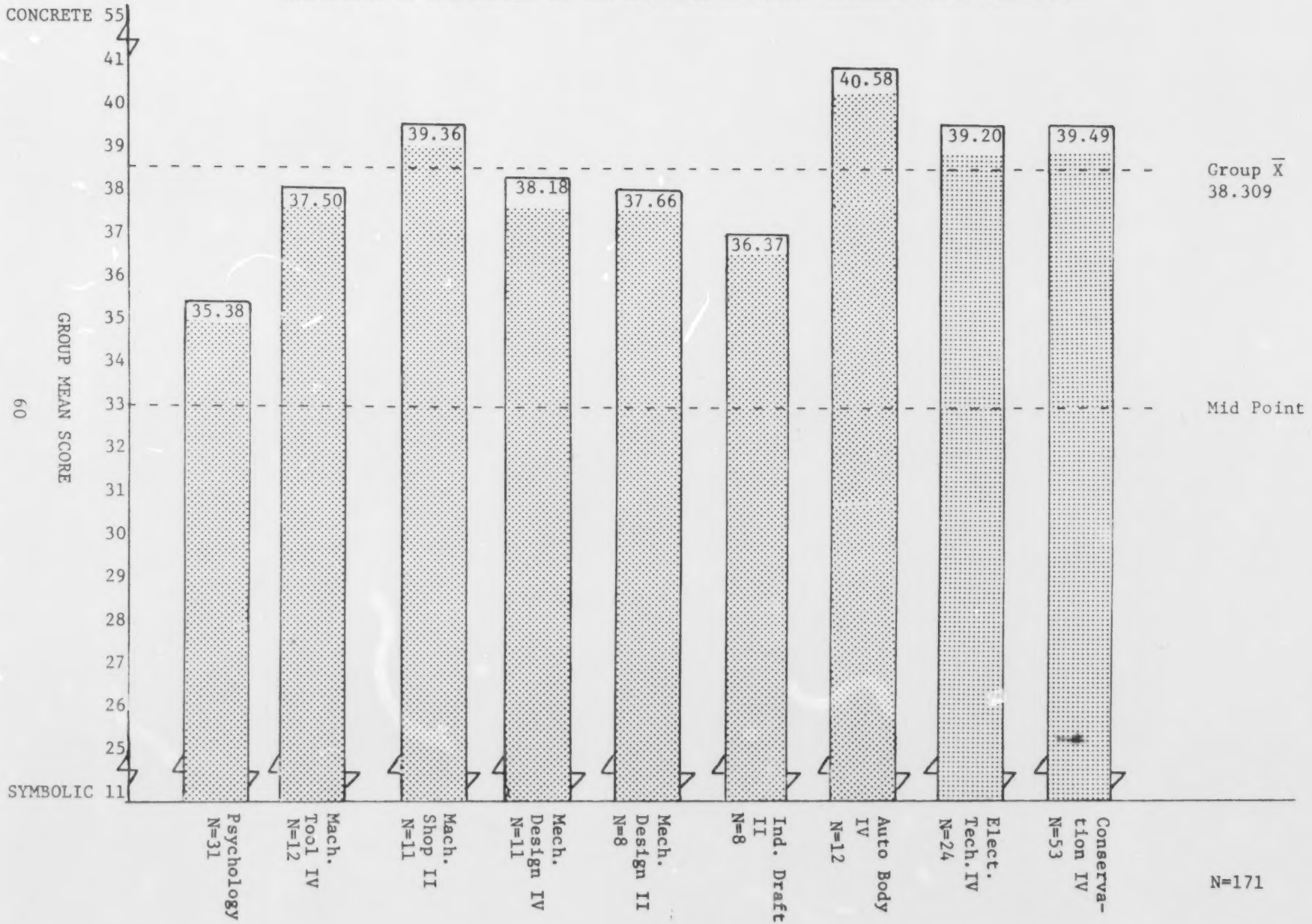
N = 171 $\bar{X}$ = 38.30
Sd.= 3.50

FIGURE 4.1

COMPARISON OF THE ART GROUPS ON THE
CONCRETE/SYMBOLIC LEARNING STYLE DIMENSIONS



COMPARISON OF ALL GROUPS ON THE CONCRETE/SYMBOLIC LEARNING STYLE DIMENSIONS



The Fox Valley Technical Institute students beginning with the Machine Tool IV group through the Conservation IV group tended toward the concrete end of the continuum. Four groups had mean scores above the total group mean. All groups measured including those of the University of Wisconsin - Stout, tended toward the concrete end of the scale. The Drawing 500, Machine Shop II, Automobile Body IV, Electronics Technology IV and Conservation IV groups all had group mean scores above the total group mean of 38.30. All remaining groups located below the group mean score but above the continuum midpoint of 33.

Structured/Unstructured Data Analysis

The item analysis of the participants on the structured/unstructured dimensions of the instrument is contained in Table 4.4. In reviewing the table, it can be noted that the mean scores ranged from 1.9-3.6 and tended to group around an average response of 3 on each item, indicating that the respondents in this study did not prefer an extremely structured or unstructured learning environment. If a preference was indicated it would be slightly above the midpoint and tending toward the structured end of the continuum.

Frequency Distribution of the Structured/Unstructured Dimensions

The frequency distribution for the art students indicates they preferred an unstructured learning environment, see Table 4.5. The mean score of 28.49 was considerably below the instrument midpoint of 33. The range was from a high structured value of 40 to a low unstructured value of 18.

The frequency distribution for the eight Fox Valley Technical Institute groups and the University of Wisconsin groups ranged from a highly structured value of 48 to a highly unstructured score of 22, see Table 4.6. The mean score of 34.26 was slightly above the midpoint of the instrument. The group tended to prefer structured learning situations.

Group Comparisons of the Structured/Unstructured Dimensions

A visual comparison of the mean scores for the eleven groups on the structured/unstructured learning styles dimensions is shown by Figures 4.3 and 4.4. Six of the eleven groups attained group means below the midpoint of the continuum. These six groups tended to prefer unstructured learning styles. The means for the remaining groups tended toward the structured end of the continuum with the Mechanical Design II, Automobile Body IV and Electronics Technology IV groups approaching a highly structured style. The art groups in comparison with the other groups preferred a more unstructured learning style.

TABLE 4.4

ITEM ANALYSIS OF THE STRUCTURED/UNSTRUCTURED LEARNING STYLE DIMENSIONS OF THE TOTAL GROUP SURVEYED

Item	Percentage of Response Per Item					Mean	Stan.Dev.	P-Cor	Q_1	Q_2	Q_3	I.Q.R.
	1	2	3	4	5							
12	0.397	0.345	0.192	0.040	0.017	1.929	0.955	0.374	1.125	1.788	2.515	1.390
13	0.333	0.350	0.251	0.046	0.017	2.064	0.962	0.408	1.250	1.975	2.761	1.511
14	0.011	0.140	0.444	0.321	0.081	3.321	0.856	0.386	2.720	3.282	3.977	1.256
15	0.040	0.169	0.368	0.309	0.111	3.280	1.004	0.232	2.607	3.285	4.051	1.444
16	0.023	0.140	0.210	0.432	0.192	3.631	1.019	-0.123	2.909	3.790	4.368	1.458
17	0.210	0.298	0.245	0.169	0.076	2.602	1.206	0.633	1.632	2.470	3.482	1.849
18	0.081	0.263	0.251	0.309	0.093	3.070	1.126	0.646	2.138	3.116	3.995	1.856
19	0.064	0.233	0.356	0.274	0.070	3.052	1.021	0.663	2.293	3.065	3.845	1.551
20	0.111	0.286	0.368	0.198	0.035	2.760	1.006	0.601	1.984	2.777	3.456	1.471
21	0.263	0.333	0.286	0.081	0.035	2.292	1.052	0.572	1.450	2.210	3.035	1.585
22	0.304	0.368	0.228	0.058	0.035	2.147	1.032	0.564	1.317	2.023	2.820	1.503

TABLE 4.5

FREQUENCY DISTRIBUTION ON THE STRUCTURED/UNSTRUCTURED LEARNING STYLE DIMENSIONS OF THE ART GROUPS

Mean Score	Frequency Distribution
40	*
39	
38	
37	
36	
35	* * * *
34	
33	----------Structured/Unstructured Continuum Midpoint
32	* * * * * *
31	*
30	
29	*
28	* *
27	*
26	
25	* *
24	* *
23	* *
22	* *
21	
20	*
19	
18	*

N = 26 $\quad \overline{X} = 28.49$

TABLE 4.6

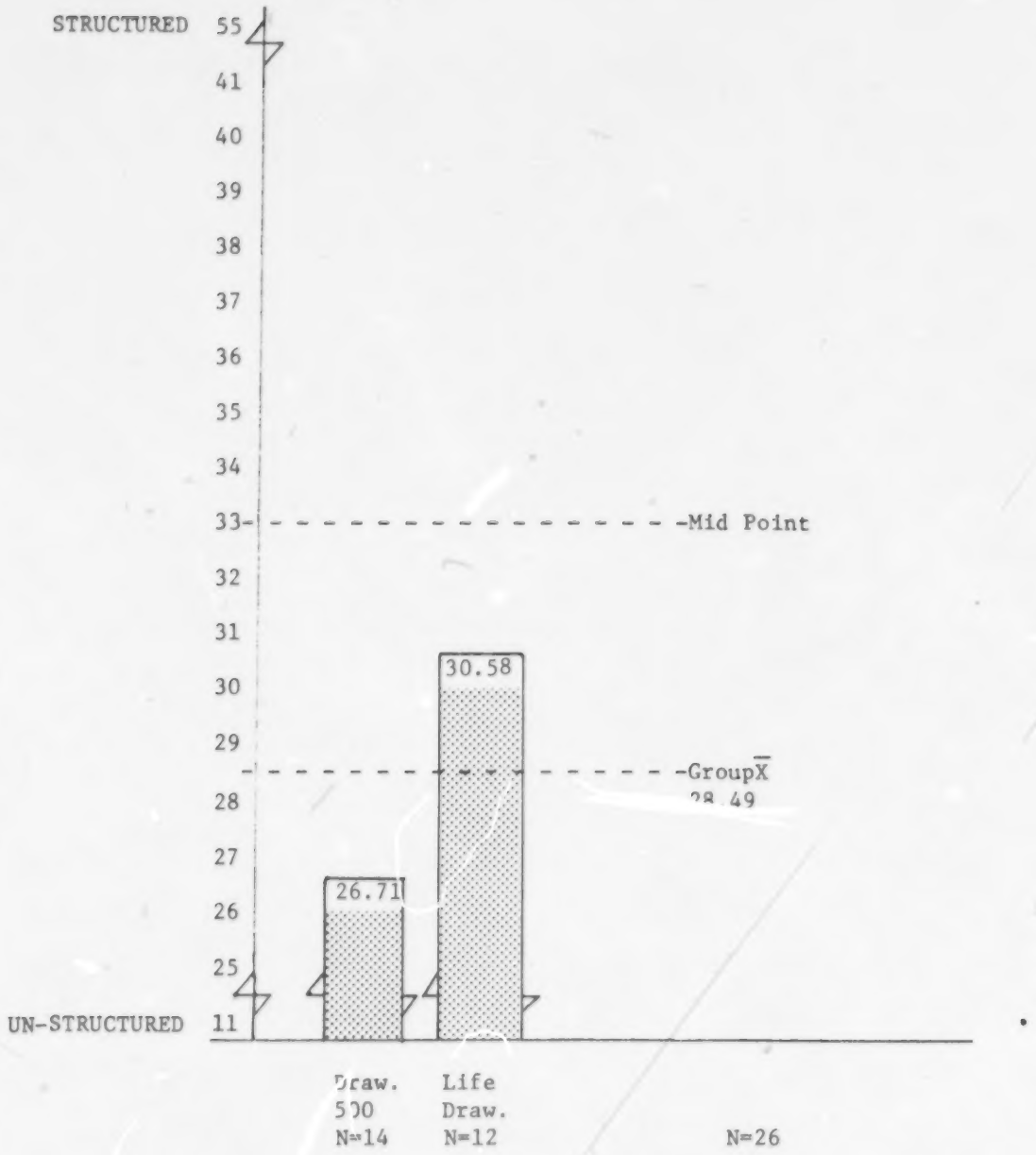
FREQUENCY DISTRIBUTION ON THE STRUCTURED/UNSTRUCTURED LEARNING STYLE DIMENSIONS OF THE TOTAL GROUP SURVEYED

Mean Score	Frequency Distribution
48	*
47	
46	* * *
45	*
44	*
43	* *
42	* * * * *
41	* * * * * *
40	* * * * * * * *
39	* * * * * * * * *
38	* * * * * * * * *
37	* * * * * * * * * *
36	* * * * * * * * * * * * * *
35	* * * * * * * * * * * * * * * *
34	* * * * * * * * * * * * * *
33	* * * * * * * * *------Structured/Unstructured Continuum Midpoint
32	* * * * * * * * * *
31	* * * * * * * * * * * * * *
30	* * * * * * * * *
29	* * * * * * * * * * *
28	* * * * *
27	* *
26	*
25	* * * * *
24	* *
23	* *
22	*
21	
20	

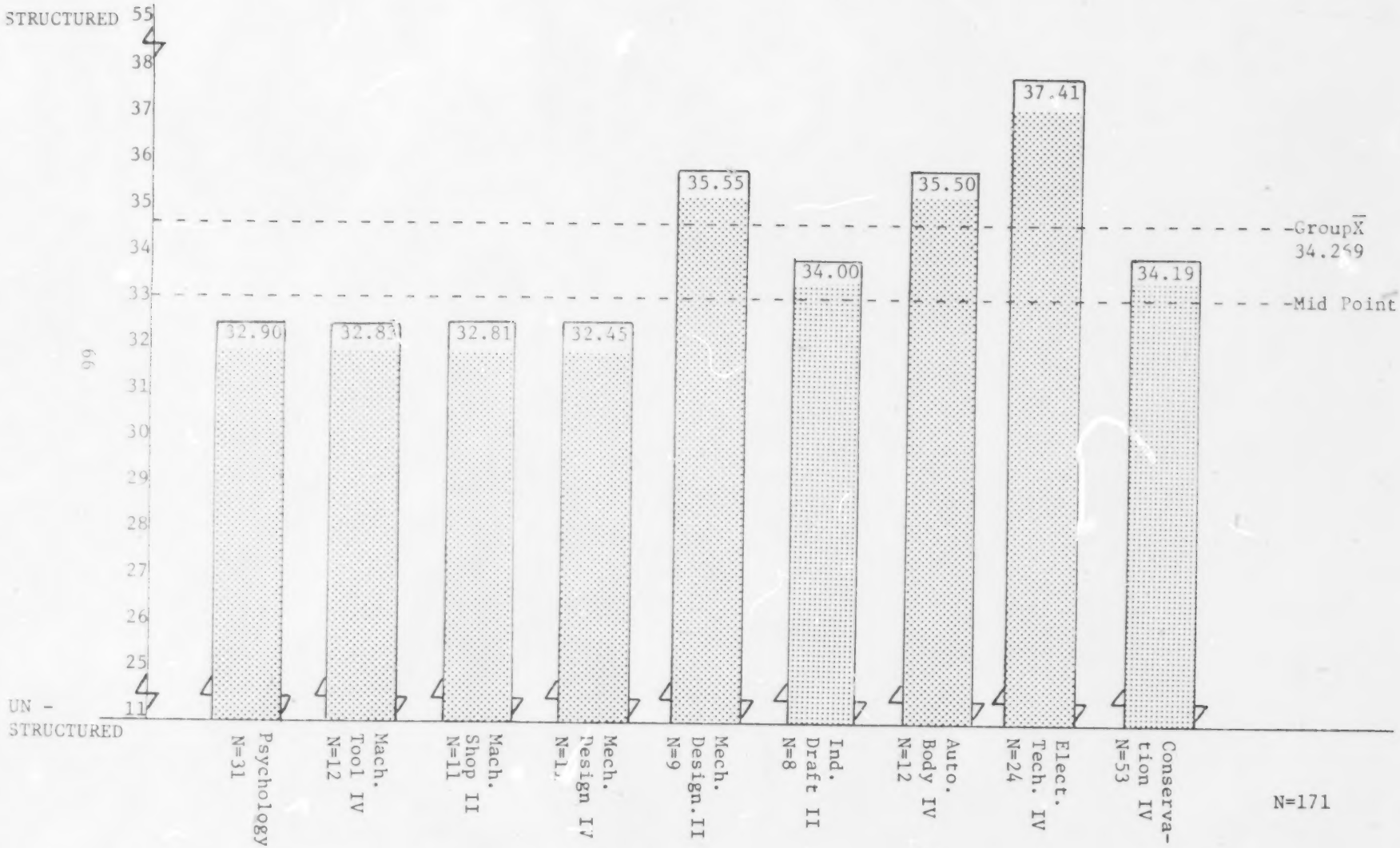
N = 171 $\bar{X}$ = 34.26
Sd. = 5.17

FIGURE 4.3

COMPARISON OF THE ART GROUPS ON THE
Structured/Unstructured Learning Style Dimensions



COMPARISON OF ALL GROUPS ON THE
STRUCTURED/UNSTRUCTURED LEARNING STYLE DIMENSIONS



The mean scores and standard deviations for each learning style dimension of the groups surveyed are contained in Table 4.7. Recalling that the continuum midpoint was designated as a value of 33 it can be determined that all groups tended toward the concrete continuum end and approached the continuum midpoint on the structured/unstructured dimensions.

The t-test values for all groups on the concrete/symbolic and structured/unstructured dimensions are contained in Tables 4.8 and 4.9. The Psychology and Industrial Drafting II groups accounted for a majority of the statistically significant differences on the concrete/symbolic learning styles dimensions, see Table 4.8.. The symbolic learning style is more evident for these two groups while the concrete style was favored by the other groups. Significant differences in learning styles existed between the Machine Tool IV and the Auto Body groups as well as the Machine Shop II and Industrial Drafting group.

Statistically significant differences existed between the Electronics Technology IV group and five of the eight remaining groups on the structured/unstructured learning styles dimensions, see Table 4.9. A stronger preference for a structured style of learning was evident in the Electronics Technology group than in the other five groups.

TABLE 4.7

MEAN SCORES AND STANDARD DEVIATIONS
FOR EACH LEARNING STYLE
DIMENSION OF THE
GROUPS SURVEYED

Group	Learning Style Dimensions	
	Concrete/ Symbolic	Structured/ Unstructured
Draw. 500		
$\bar{X}$	39.42	26.71
Sd	4.13	5.41
Life Draw.		
$\bar{X}$	37.66	30.58
Sd.	2.28	4.73
Psychology		
$\bar{X}$	35.38	32.90
Sd	2.95	5.84
Mach. Tool IV		
$\bar{X}$	37.50	32.83
Sd	2.81	4.81
Mach. Shop II		
$\bar{X}$	39.36	32.81
Sd	1.55	3.45
Mech. Design IV		
$\bar{X}$	38.18	32.45
Sd	3.73	5.10
Mech. Design II		
$\bar{X}$	37.66	35.55
Sd	3.82	5.01
Ind. Draft		
$\bar{X}$	36.37	34.00
Sd	1.49	2.82
Auto. Body		
$\bar{X}$	40.58	35.50
Sd	3.06	4.11
Elect. Tech. IV		
$\bar{X}$	39.20	37.41
Sd	2.67	4.70
Conservation IV		
$\bar{X}$	39.49	34.19
Sd	3.49	5.12
Total Group $\bar{X}$	38.30*	34.26*

*Does not include art group $\bar{X}$ scores.

TABLE 4.8

t-TEST COMPARISON OF THE MEAN SCORES OF ALL GROUPS ON THE CONCRETE/SYMBOLIC LEARNING STYLE DIMENSIONS

	Psychology	Machine Tool IV	Machine Shop II	Mechanical Desigr. IV	Mechanical Design II	Industrial Drafting II	Automobile Body IV	Electronics Tech-nology IV	Conservation IV
Psychology		2.07*	4.15*	2.44*	1.84	.89	4.99*	4.85*	5.41*
Machine Tool IV			1.85	.47	.10	.98	2.45*	1.72	1.81
Machine Shop II				.92	1.27	3.97*	1.13	.17	.11
Mechanical Design IV					.28	1.22	1.61	.89	1.09
Mechanical Design II						.84	1.84	1.25	1.40
Industrial Drafting II							3.42*	2.75*	2.28*
Automobile Body IV								1.34	1.31
Electronics Technology IV									.05
Conservation IV									

* $p \leq .05$

TABLE 4.9

t-TEST COMPARISONS OF THE MEAN SCORES OF ALL GROUPS ON THE STRUCTURED/UNSTRUCTURED LEARNING STYLE DIMENSIONS

	Psychology	Machine Tool IV	Machine Shop II	Mechanical Design IV	Mechanical Design II	Industrial Drafting II	Automobile Body IV	Electronics Technology IV	Conservation IV
Psychology		.03	.04	.22	1.20	.50	1.37	3.03*	1.04
Machine Tool IV			.00	.17	1.19	.58	1.39	2.65*	.82
Machine Shop II				.18	1.36	.74	1.60	2.81*	.33
Mechanical Design IV					1.29	.73	1.51	2.73*	1.00
Mechanical Design II						.72	.02	.96	.73
Industrial Drafting II							.85	1.87	.21
Automobile Body IV								1.16	.71
Electronics Technology IV									2.48*
Conservation IV									

* $p < .05$

Learning Styles and Class Performance

A comparison of the performance in a symbolic class of eight highly concrete students with eight highly symbolic students is shown in Table 4.10. The eight students preferring a highly concrete learning style had a continuum mean of 46 while the eight highly symbolic students had a mean of 33. No Fox Valley Technical Institute students placed lower than the midpoint of 33 on the continuum scale.

TABLE 4.10

RELATIONSHIP BETWEEN CLASS PERFORMANCE AND LEARNING STYLES OF EIGHT HIGHLY CONCRETE STUDENTS WITH EIGHT HIGHLY SYMBOLIC STUDENTS

Style	N	Continuum $\bar{X}$	Cum. GPA $\bar{X}$	Cum. GPA sd.	Math GPA $\bar{X}$	Math GPA sd.
Concrete	8	46	2.82	.633	2.85	1.19
Symbolic	8	33	2.83	.293	3.14	.904

Although there was considerable difference in the concrete/symbolic scores between groups the cumulative grade point for the two groups was nearly identical. The concrete students GPA was 2.82 while the GPA of the symbolic students was 2.83.

All students were required to complete either applied or technical mathematics. A comparison was made between the two groups for the grade averages they attained in the mathematics classes. Based on the grade point averages a difference in math scores was noted between the most highly concrete and most highly symbolic. The concrete students' grade average in mathematics was 2.85 and the symbolic students average was 3.14. Highly concrete students do not do as well as symbolic students in a symbolic instructional environment such as mathematics. It must be pointed out that other variables may exist, but an interesting implication is evident. The difference between the two means were not statistically significant.

There appears to be some relationship between the student's performance in class and learning styles. Learning styles appear to affect a student's success on other measures divergent from the student's learning style.

PART II - STUDENT SURVEY DATA

Introduction

As a part of the Learning Styles Project, students at Fox Valley Technical Institute were surveyed to identify their preferences for learning, human traits, attitude toward individualized learning and their opinions concerning individualized learning at Fox Valley Technical Institute. The purpose of this survey was to provide information within which to make a decision concerning the development or modification of individualized programs at Fox Valley Technical Institute. The information from this report was combined with the data generated from the Teacher Survey and the Faculty Interview and used in a composit manner to prepare a report on recommendations and implications of individualized instruction at Fox Valley Technical Institute.

Methodology

Multiple surveys were prepared by the researcher to be used to survey the students. The information on the surveys came from previous surveys used in other studies by the researcher and from student comments concerning instruction at FVTI. After the surveys were prepared, they were presented to the Student Senate Learning Styles Advisory Committee and the Faculty Advisory Committee. The Student Senate Advisory Committee was appointed by Duane Stevens, Assistant Director of Student Services. The Faculty Advisory Committee was appointed by the Faculty Association Executive Committee. Based upon

their comments, minor revisions were made in the surveys. Revised copies of the surveys were presented a second time to the Student Senate Advisory Committee. They made some additional suggestions on the wording and recommended that the surveys be combined into one large student survey.

In discussions with Mr. Spanbauer it was decided to only administer the first half or the second half of the survey to assembled students and not the entire survey to the same students.

Multiple copies of the student survey were prepared by the Word Processing Service Center for use. John Banks of the University of Wisconsin -- Stout delivered scoring pencils and IBM mark sense sheets to be used by the students in completing the survey. A pretest of the survey was conducted in several classes to identify the length of time and to sort out problems. The pretest was successful; therefore, final plans were formed to complete the administration of the survey.

Carolyn Ecker randomly selected intact classes in the major program areas in which a majority of the students enrolled in vocational-technical programs would be attending. A composit listing of the classes was prepared and then each were randomly assigned a one or two to designate which half of the survey would be completed by each class.

Each teacher was contacted ahead of time to determine the time and place for the survey. Then a survey schedule was prepared to guide those giving the surveys.

When the survey was administered, a standard introduction was read to the class along with explicit instructions. In order to facilitate uniformity of survey administration, the two secretaries assisting with the survey were trained by going along with the researcher and observing him giving the survey. Later on the researcher monitored their giving the survey to insure conformity.

Data Analysis

The data were computer analyzed by sex, age, semester in school, program in which the students were enrolled and by grade point averages. It was felt that each of these variables would affect how the student scored the survey.

To facilitate the computation and analysis of the data in the different sections of the survey instrument, the following values and intervals were used.

Item	Computational Value Assigned	Interval Limits
Situation Choice 1	1	1.0-1.499
Situation Choice 2	2	1.5-2.0
Never	1	1.0-1.49
Sometimes	2	1.5-2.49
Usually	3	2.5-3.49
Always	4	3.5-4.0
Strongly Agree	1	1.0-1.49
Agree	2	1.5-2.49
No Opinion	3	2.5-3.49
Disagree	4	3.5-4.49
Strongly Disagree	5	4.5-5.0

Whenever the mean value fell into a given interval it was assigned to the major category. For instance, a mean value of 4.6 would be assigned the category of strongly agree. Sometimes the assigning of a category to a given mean value results in an obvious misassignment of the item being rated. For example, suppose the mean value for an item using an agreement table is 2.6. The item is assigned the category of no opinion. Looking at the percentage of responses, it may be found that 55% of the respondents agreed with the item. Also by looking at Q2 on the tables which is the median, it may have been found that the value was 2.4. Obviously in interpreting the data for these items, one should always look at the percentages who responded and the quartiles of responses. Therefore, some of the categorical divisions contain the percentages who agreed or disagreed with the item to compensate for the possible categorical errors.

Number of Students Surveyed

A total of 581 Fox Valley Technical Institute students completed the survey. Of this number, 410 were males and 171 were females.

Data Analysis

A listing of the percentages, means, standard deviations, and quartile deviations of the Generalized Situational Choice Inventory is contained in Table 4.11. An analysis of the table revealed the following:

Profile of Typical FVTI Students*

The typical FVTI student would prefer to:

1. Do well in school.
2. Receive a grade on the basis of how hard he tried.
3. Be well prepared for a job after graduation.
4. Take chances on getting a higher or lower grade at the end of the course.
5. Be successful in finishing a school assignment.
6. Receive excellent grades because of a great deal of ability.
7. Do better than most of his classmates.
8. Work slowly with great thoroughness.
9. Complete his/her assignments while at school.
10. Attend classes which require very little reading and a lot of discussion by the teacher.
11. Attend a class where he/she can express ideas, talents and skills.
12. Attend a class where he/she can perform activities or do things.
13. Attend a class where he/she competes only with himself/herself.
14. Attend a class which has high work standards.
15. Attend a class where he/she can come and go as he/she pleases.
16. Attend a class where he/she can decide how the work is to be done.
17. Attend a class which permits him/her to take days off when he/she wants to.

*The numbers do not indicate a ranking of these items.

TABLE 4.11

PERCENTAGES, MEANS, STANDARD DEVIATIONS, AND QUARTILE DEVIATIONS ON THE GENERALIZED SITUATIONAL CHOICE INVENTORY OF SELECTED FVTI STUDENTS (N=314)

		Percentage of Responses By Item										
Item	Omit	1	2	3	4	5	Mean	Stan Dev	P-Cor	Q1	Q2	Q3	IQR
9	0.009	0.085	0.904	0.000	0.000	0.000	1.913	0.281	0.274	1.678	1.952	2.226	0.547
10	0.012	0.401	0.585	0.000	0.000	0.000	1.593	0.491	0.402	1.115	1.657	2.078	0.963
11	0.009	0.802	0.187	0.000	0.000	0.000	1.189	0.392	0.262	0.808	1.117	1.425	0.617
12	0.012	0.111	0.875	0.000	0.000	0.000	1.887	0.316	0.419	1.654	1.936	2.218	0.563
13	0.000	0.866	0.133	0.000	0.000	0.000	1.133	0.340	0.217	0.788	1.077	1.365	0.577
14	0.000	0.665	0.334	0.000	0.000	0.000	1.334	0.471	0.313	0.875	1.251	1.752	0.876
15	0.000	0.296	0.703	0.000	0.000	0.000	1.703	0.456	0.332	1.344	1.789	2.144	0.800
16	0.003	0.280	0.716	0.000	0.000	0.000	1.718	0.449	0.296	1.389	1.804	2.152	0.763
17	0.000	0.646	0.353	0.000	0.000	0.000	1.353	0.478	0.384	0.886	1.273	1.792	0.906
18	0.000	0.843	0.156	0.000	0.000	0.000	1.156	0.362	0.053	0.796	1.092	1.388	0.592
19	0.000	0.292	0.707	0.000	0.000	0.000	1.707	0.455	0.339	1.353	1.792	2.146	0.793
20	0.000	0.882	0.117	0.000	0.000	0.000	1.117	0.322	0.078	0.783	1.066	1.350	0.566
21	0.003	0.907	0.089	0.000	0.000	0.000	1.089	0.285	0.246	0.774	1.049	1.323	0.549
22	0.006	0.929	0.063	0.000	0.000	0.000	1.064	0.244	0.184	0.767	1.034	1.301	0.534
23	0.000	0.496	0.503	0.000	0.000	0.000	1.503	0.499	0.435	1.003	1.506	2.003	0.999
24	0.000	0.853	0.146	0.000	0.000	0.000	1.146	0.353	0.376	0.792	1.085	1.378	0.585
25	0.003	0.582	0.414	0.000	0.000	0.000	1.415	0.492	0.374	0.927	1.355	1.898	0.970
26	0.006	0.703	0.289	0.000	0.000	0.000	1.291	0.454	0.253	0.852	1.205	1.642	0.789
27	0.000	0.404	0.595	0.000	0.000	0.000	1.595	0.490	0.408	1.118	1.660	2.080	0.962
28	0.003	0.859	0.136	0.000	0.000	0.000	1.137	0.344	0.134	0.789	1.079	1.369	0.579
29	0.003	0.162	0.834	0.000	0.000	0.000	1.837	0.369	0.160	1.604	1.902	2.201	0.597
30	0.003	0.824	0.171	0.000	0.000	0.000	1.172	0.377	0.066	0.802	1.104	1.406	0.604
31	0.000	0.538	0.461	0.000	0.000	0.000	1.461	0.498	0.183	0.964	1.428	1.958	0.994
32	0.006	0.856	0.136	0.000	0.000	0.000	1.137	0.344	0.135	0.789	1.079	1.369	0.579
33	0.019	0.194	0.786	0.000	0.000	0.000	1.801	0.398	0.290	1.564	1.876	2.188	0.623
34	0.012	0.665	0.321	0.000	0.000	0.000	1.325	0.468	0.207	0.870	1.241	1.732	0.861
35	0.000	0.191	0.808	0.000	0.000	0.000	1.808	0.393	0.233	1.572	1.881	2.190	0.618
36	0.000	0.283	0.716	0.000	0.000	0.000	1.716	0.450	0.405	1.382	1.802	2.151	0.769
37	0.000	0.159	0.840	0.000	0.000	0.000	1.840	0.365	0.212	1.607	1.905	2.202	0.594
38	0.003	0.308	0.687	0.000	0.000	0.000	1.690	0.462	0.151	1.306	1.775	2.137	0.831

18. Attend a class which meets in the mornings.

19. Attend a class which only meets several days a week.

20. Attend classes which allow him/her to work with tools, materials, and equipment.

21. Attend classes in a learning situation that allows him/her to interact with fellow classmates on a group basis.

22. Attend classes which teach him/her job skills.

23. Attend classes that require a great deal of verbal (talk) exchange.

24. Attend classes which allow him/her to learn at his/her own best rate and to take tests whenever he/she feels ready to take them.

25. Complete courses within a group environment.

Other Segments of Students

30.8% would prefer to complete courses via self-instructional techniques with films, slides, and tapes always available.

15.9% of the students prefer to learn by themselves without a teacher.

46.1% of the students prefer to attend classes where they can interact with a small group of students or work 1 on 1 with the teacher.

19.4% of the students would prefer to attend classes which require them to do a great deal of reading.

71.6% of the students prefer to attend classes that allow them to learn at their own best rate and to take tests whenever they feel they are ready.

84.3% of the students would prefer to review audiovisual materials during class in the classroom and not go to the learning resources center.

Human Traits of Selected FVTI Students

Of the 29 items rated by the selected students on the Human Trait Inventory, only one was rated as always, 16 were rated as usually, 12 were rated as sometimes and none were rated as never, see Table 4.12.

The profile of these students are listed below. The order of listing does not indicate a ranking.

The typical FVTI student always:

1. Gets a great deal of satisfaction when he/she does something better than what is expected of him/her.

The typical FVTI student usually:

1. Feels that most of his/her school subjects are useful.
2. Likes to make the best grades possible.
3. Likes to compete with other students for grades.
4. Likes to plan his/her own study activities.
5. Likes being with people in social gatherings.
6. Gets along with his/her fellow students.
7. Enjoys reading non-school books.
8. Likes to plan his/her activities in advance.
9. Enjoys reading.
10. Enjoys viewing slides.
11. Enjoys laboratory work.
12. Enjoys his/her teachers at FVTI.
13. Is more alert in the mornings.
14. Enjoys working by himself/herself.
15. Enjoys class discussions.
16. Likes classes where he/she is tested out on his/her actual skills rather than by paper and pencil tests.

The typical FVTI student sometimes:

1. Finds that it is difficult for him/her to keep interested in

TABLE 4.12

PERCENTAGES, MEANS, STANDARD DEVIATIONS, AND QUARTILE DEVIATIONS ON THE HUMAN TRAIT INVENTORY OF SELECTED FVTI STUDENTS (N=314)

		Percentage of Responses By Item											
Item	Omit	1	2	3	4	5	Mean	Stan Dev	P-Cor	Q1	Q2	Q3	IQR
39	0.000	0.076	0.837	0.076	0.009	0.000	2.019	0.436	0.380	1.707	2.005	2.304	0.596
40	0.003	0.012	0.229	0.576	0.178	0.000	2.923	0.673	0.425	2.512	2.944	3.377	0.864
41	0.000	0.101	0.786	0.082	0.028	0.000	2.038	0.545	0.416	1.688	2.006	2.323	0.635
42	0.003	0.047	0.722	0.175	0.050	0.000	2.230	0.622	0.456	1.778	2.123	2.468	0.689
43	0.003	0.130	0.490	0.347	0.028	0.000	2.274	0.720	0.489	1.741	2.250	2.864	1.122
44	0.012	0.015	0.082	0.302	0.585	0.000	3.477	0.716	0.468	2.989	3.657	4.078	1.089
45	0.006	0.146	0.305	0.340	0.200	0.000	2.59	0.968	0.549	1.833	2.630	3.359	1.526
46	0.006	0.149	0.630	0.136	0.076	0.000	2.141	0.759	0.418	1.656	2.050	2.444	0.787
47	0.006	0.280	0.461	0.140	0.111	0.000	2.083	0.929	0.452	1.386	1.968	2.522	1.136
48	0.003	0.070	0.420	0.318	0.187	0.000	2.626	0.866	0.157	1.926	2.525	3.307	1.381
49	0.012	0.022	0.264	0.391	0.308	0.000	3.000	0.819	0.417	2.349	3.028	3.701	1.351
50	0.015	0.003	0.050	0.487	0.442	0.000	3.391	0.601	0.437	2.893	3.398	3.944	1.050
51	0.003	0.047	0.414	0.334	0.200	0.000	2.690	0.843	0.413	1.986	2.609	3.354	1.368
52	0.006	0.267	0.398	0.257	0.070	0.000	2.131	0.799	0.458	1.428	2.076	2.808	1.380
53	0.003	0.366	0.519	0.070	0.041	0.000	1.785	0.746	0.439	1.180	1.754	2.234	1.054
54	0.006	0.031	0.219	0.490	0.251	0.000	2.967	0.775	0.376	2.485	3.000	3.512	1.027
55	0.012	0.003	0.076	0.197	0.710	0.000	3.635	0.637	0.477	3.346	3.804	4.152	0.805
56	0.006	0.404	0.512	0.070	0.006	0.000	1.676	0.631	0.499	1.114	1.680	2.164	1.050
57	0.003	0.066	0.375	0.369	0.184	0.000	2.674	0.851	0.509	1.985	2.650	3.325	1.340
58	0.003	0.041	0.480	0.363	0.111	0.000	2.546	0.744	0.308	1.932	2.450	3.120	1.188
59	0.012	0.035	0.324	0.394	0.232	0.000	2.835	0.824	0.372	2.151	2.838	3.463	1.311
60	0.006	0.175	0.627	0.159	0.031	0.000	2.048	0.680	0.304	1.616	2.012	2.408	0.791
61	0.003	0.019	0.235	0.589	0.152	0.000	2.878	0.672	0.393	2.476	2.913	3.336	0.860
62	0.009	0.146	0.312	0.347	0.184	0.000	2.575	0.955	0.398	1.823	2.605	3.318	1.494
63	0.012	0.019	0.531	0.334	0.101	0.000	2.525	0.703	0.146	1.928	2.392	3.066	1.138
64	0.015	0.085	0.681	0.187	0.028	0.000	2.161	0.607	0.321	1.734	2.095	2.456	0.721
65	0.012	0.031	0.318	0.493	0.143	0.000	2.758	0.733	0.480	2.175	2.790	3.290	1.115
66	0.012	0.146	0.458	0.283	0.098	0.000	2.338	0.848	0.475	1.718	2.256	2.977	1.258
67	0.015	0.019	0.283	0.404	0.277	0.000	2.954	0.803	0.232	2.300	2.968	3.612	1.311

most of his/her school subjects.

2. Has a hard time concentrating on the subjects during class time.

3. Finds that his/her mind tends to wander when he/she sits down to study.

4. Likes to study.

5. Learns slowly.

6. Does not like to compete with other students for grades.

7. Can read for long periods of time without tiring.

8. Has trouble getting his/her school assignments in on time.

9. Feels that most of his/her subjects are a complete waste of time.

10. Enjoys classroom work rather than laboratory work.

11. Enjoys working in a large group.

12. Likes to attend classes which requires assignments to be due on certain dates.

Attitude Toward Individualized Instruction

In responding to the 20 items of the Individualized Learning Attitude Scale, the students agreed with 7 items, they were uncertain about 11 items, and they disagreed with 2 items, see Table 4.13.

The students agreed that:

		% who agreed	% who disagreed
1.	Through individualized learning, the teacher has more time to give to the individual needs of students.	67.7	25.0
2.	Most students like to be responsible for their education.	63.2	18.7
3.	Individualized learning allows one to work at his own speed.	83.8	11.2
4.	Individualized learning allows one to study in depth in areas of interest.	69.9	19.7

		% who agreed	% who disagreed
5.	Since students can review slides and other references as often as they wish in individualized learning, students should achieve a better understanding of the subject.	64.3	22.4
6.	Increased student/teacher contact in individualized study may help the student understand the subject better than with traditional classroom instruction.	71.1	16.0
7.	Students may learn less with individualized instruction if they are given the option to choose "what" and "how much" they study.	66.5	20.1

The students were uncertain whether:

1.	Individual learning is based on the same learning principles as good traditional classroom instruction.	32.9	56.1
2.	Individualized assignments may hinder one's social development.	25.3	59.3
3.	It is enjoyable to study subjects on one's own.	58.7	29.9
4.	They would volunteer to enroll if some subjects were available on an individualized learning basis.	49.8	21.2
5.	Individualized learning provides a better way of grading students since each student is evaluated according to his ability and personal progress.	58.4	25.7
6.	Working on one's own is boring.	26.2	56.1
7.	Individualized assignments encourage students to do less work than with traditional classroom instruction.	33.3	48.2

TABLE 4.13

PERCENTAGES, MEANS, STANDARD DEVIATIONS, AND QUARTILE DEVIATIONS ON THE INDIVIDUALIZED LEARNING ATTITUDE SCALE OF SELECTED FVTI STUDENTS (N=267)

		Percentage of Responses By Item										
Item	Omit	1	2	3	4	5	Mean	Stan Dev	P-Cor	Q1	Q2	Q3	IQR
68	0.007	0.022	0.307	0.101	0.479	0.082	3.294	1.062	0.329	2.234	3.636	4.154	1.919
69	0.000	0.059	0.194	0.191	0.456	0.097	3.337	1.080	0.398	2.475	3.618	4.165	1.690
70	0.000	0.176	0.411	0.112	0.243	0.056	2.591	1.190	0.607	1.679	2.286	3.703	2.024
71	0.003	0.179	0.498	0.067	0.176	0.074	2.466	1.189	0.545	1.639	2.139	3.510	1.871
72	0.000	0.142	0.490	0.179	0.161	0.026	2.438	1.005	0.471	1.719	2.229	3.151	1.431
73	0.007	0.307	0.531	0.041	0.071	0.041	2.000	1.005	0.547	1.307	1.855	2.322	1.014
74	0.003	0.041	0.191	0.101	0.352	0.310	3.703	1.210	0.130	2.666	3.968	4.698	2.032
75	0.000	0.131	0.367	0.288	0.134	0.078	2.662	1.107	0.549	1.823	2.506	3.373	1.549
76	0.003	0.149	0.550	0.097	0.164	0.033	2.379	1.034	0.553	1.680	2.132	2.980	1.300
77	0.000	0.131	0.453	0.157	0.198	0.059	2.602	1.121	0.624	1.762	2.314	3.542	1.780
78	0.000	0.071	0.191	0.176	0.423	0.138	3.367	1.148	0.474	2.436	3.646	4.236	1.800
79	0.007	0.033	0.108	0.112	0.449	0.288	3.856	1.061	0.151	3.441	4.037	4.639	1.197
80	0.003	0.086	0.247	0.179	0.363	0.119	3.184	1.185	0.456	2.159	3.416	4.144	1.985
81	0.000	0.112	0.374	0.243	0.198	0.071	2.741	1.113	0.714	1.867	2.553	3.599	1.731
82	0.000	0.142	0.501	0.131	0.168	0.056	2.494	1.099	0.666	1.714	2.212	3.307	1.592
83	0.000	0.161	0.550	0.127	0.131	0.029	2.318	0.990	0.546	1.661	2.115	2.801	1.139
84	0.000	0.067	0.191	0.269	0.389	0.082	3.228	1.061	0.599	2.455	3.395	4.069	1.613
85	0.003	0.157	0.355	0.228	0.209	0.044	2.627	1.114	-0.251	1.757	2.457	3.526	1.768
86	0.000	0.134	0.531	0.131	0.164	0.037	2.438	1.034	0.157	1.716	2.186	3.135	1.419
87	0.003	0.044	0.217	0.161	0.438	0.134	3.402	1.103	-0.191	2.439	3.670	4.239	1.799

		% who agreed	% who disagreed
8.	Individualized learning should result in a better education for most students.	48.6	26.9
9.	One will work harder if he is studying the subject by himself.	25.8	48.1
10.	They usually perform better when they attend group instruction and am competing with fellow students.	51.2	25.3
11.	They prefer to attend classes in a large group.	26.1	57.2

The students disagreed with the statements:

1.	Regardless of ability, all students should be graded the same.	23.2	45.3
2.	Most students do not care what method of course organization is used in their educational pursuits.	14.1	73.7

Student Attitude Toward Individualized Instruction at FVTI

Selected FVTI students were surveyed via a 57 item Individualized Learning Student Opinionnaire to determine their attitude toward individualized instruction at FVTI. The students agreed with 19 items; they were uncertain about 36 items and they disagreed with 2 items. A summary of responses is contained in Table 4.14.

The students agreed that:

		% who agreed	% who disagreed
1.	Examinations should be administered only after a unit is completed by the student.	76.3	13.0
2.	Guidelines and suggested due dates for the completion of individual study units and projects should be given to the students at the beginning of a course.	82.7	9.3

	% who agreed	% who disagreed
3. The teacher/student relationship is good with individualized instruction.	63.9	19.4
4. Teachers should meet with the slower students more often and help them with problems.	82.3	5.2
5. In some individualized classes, it is desirous to work with other students or people.	82.7	6.6
6. Instructors should go through the individualized Study Units with the class.	72.2	9.3
7. A presentation of an individual study unit should be made by the instructor.	80.4	8.9
8. A discussion with the teacher should be held following the presentation.	80.4	8.9
9. After the discussion, students should then complete the Individual Study Units.	74.8	7.8
10. If tapes, slides, etc., are a part of an individualized course they should be in the same room as where the instruction takes place.	63.6	18.2
11. It is very hard to be self-motivated to complete units when no due dates are established.	59.9	26.4
12. Instructors should indicate target dates when projects are to be completed.	85.3	7.0
13. Class discussions would add to understanding of the units.	83.8	7.7
14. Instructors should personally talk with those students who are falling behind in the class assignments.	80.5	7.0

	% who agreed	% who disagreed
15. Course grades should be based upon quality of work and not on the quantity or numbers of units completed.	59.4	18.3
16. Space should be provided for small group discussions apart from the classroom.	74.1	6.6
17. Course grades should be based upon a happy median between quality and quantity of work completed.	68.4	13.3
18. Provision should be made for regularly scheduled discussion periods with the teacher.	69.2	11.5
19. The teacher's technique of use of a unit or package is critical in the success or failure in teaching.	74.8	9.6
The students were uncertain whether:		
1. A lot of cheating takes place with this type of instruction.	44.8	33.2
2. They did not learn much with this type of presentation (or learning): Reason why?	33.2	45.6
3. They only have to remember the materials to pass the unit test.	53.2	23.1
4. They did not understand the units.	18.6	45.7
5. Teacher help was not always available.	33.3	40.0
6. The final exam did not count.	14.9	42.6
7. Group discussion was limited.	46.0	26.1
8. Many of the exams were of the paper and pencil types in this class which are not too meaningful.	34.7	40.7

	% who agreed	% who disagreed
9. In the technical areas, they were always tested out on their acquired mechanical skills by the instructor.	37.4	30.6
10. A lot of emphasis was placed on the actual performance of a skill rather than performance on a paper and pencil test.	38.9	37.0
11. They personally have seen students trade answers for their unit self-exams.	44.1	34.0
12. Self-exams should not count toward course grades.	44.5	30.2
13. They personally knew of students who had the answers to unit exams or to the final post-test exams.	32.1	42.6
14. They stood in line a lot to have their materials graded.	42.6	31.8
15. Too much of my learning has been based on reading.	44.1	36.8
16. Instructors are not familiar with all areas of the individualized programs.	37.0	32.5
17. Many students wait until the end of the term or semester and then hand in all their assignments at one time.	51.6	24.2
18. Much of the information in the Individual Study Units is outdated and is hard to relate to the shop (laboratory) work.	19.0	50.9
19. Most teachers do not push the students who lack motivation or drive.	57.2	21.6
20. Students should be required to attend school a set number of hours per week.	34.7	52.0

	% who agreed	% who disagreed
21. Attendance of instructor presentations should be optional and not required.	34.4	45.2
22. During the completion of the Individual Study Units, teachers should come around the room and ask questions.	56.1	23.2
23. They received more individual help in individualized courses than in non-individualized courses.	38.4	42.6
24. They like to study units on a due date basis.	56.1	27.2
25. Instructors should walk around the room and ask the students questions.	47.8	34.7
26. Students should not have alternative choices in completing projects and class assignments.	29.1	49.4
27. Attendance should not be required at FVTI.	37.0	46.0
28. They don't remember a thing when they read a package or individual study unit.	10.8	48.2
29. There are ample slides, tapes, and other audiovisual materials for use with the Individual Study Units or Packages.	51.6	28.8
30. This method of instruction makes learning too mechanical.	38.5	35.5
31. They had difficulty reading the written material that was used.	32.1	51.2
32. They felt frustrated by the instructional situation.	40.7	34.4
33. This is a poor way for me to learn skills.	36.2	47.8

TABLE 4.14

PERCENTAGES, MEANS, STANDARD DEVIATIONS, AND QUARTILE DEVIATIONS ON THE INDIVIDUALIZED LEARNING STUDENT OPINIONNAIRE OF SELECTED FVTI STUDENTS (N=267)

Item	Omit	Percentage of Responses By Item 1	2	3	4	5	Mean	Stan Dev	P-Cor	Q1	Q2	Q3	IQR
88	0.003	0.164	0.284	0.213	0.288	0.044	2.763	1.166	0.349	1.796	2.728	3.792	1.996
89	0.000	0.074	0.258	0.209	0.367	0.089	3.138	1.124	0.578	2.177	3.294	4.063	1.886
90	0.007	0.194	0.348	0.217	0.213	0.018	2.509	1.088	0.379	1.653	2.365	3.426	1.773
91	0.003	0.033	0.153	0.352	0.404	0.052	3.289	0.906	0.423	2.675	3.382	4.013	1.338
92	0.003	0.101	0.232	0.262	0.378	0.022	2.988	1.053	0.317	2.137	3.128	3.900	1.763
93	0.003	0.026	0.123	0.419	0.340	0.086	3.338	0.895	0.294	2.736	3.330	4.021	1.285
94	0.000	0.142	0.318	0.277	0.205	0.056	2.715	1.112	0.202	1.838	2.641	3.559	1.720
95	0.003	0.078	0.269	0.239	0.370	0.037	3.018	1.052	0.356	2.131	3.125	3.929	1.797
96	0.011	0.056	0.318	0.307	0.273	0.033	2.909	0.976	0.217	2.100	2.890	3.719	1.619
97	0.000	0.056	0.333	0.239	0.307	0.063	2.988	1.058	0.204	2.081	2.960	3.893	1.811
98	0.000	0.146	0.295	0.217	0.273	0.067	2.820	1.179	-0.259	1.851	2.767	3.832	1.980
99	0.000	0.187	0.576	0.104	0.101	0.029	2.209	0.960	0.155	1.608	2.042	2.475	0.866
100	0.000	0.131	0.314	0.250	0.258	0.044	2.771	1.106	0.133	1.877	2.716	3.706	1.828
101	0.003	0.127	0.194	0.247	0.284	0.142	3.120	1.244	0.294	2.125	3.212	4.125	2.000
102	0.000	0.116	0.310	0.153	0.355	0.063	2.940	1.175	0.338	1.930	2.975	3.976	2.045
103	0.003	0.116	0.325	0.183	0.344	0.026	2.838	1.103	0.357	1.908	2.806	3.853	1.945
104	0.003	0.078	0.292	0.299	0.273	0.052	2.928	1.043	0.340	2.083	2.925	3.780	1.697
105	0.000	0.119	0.397	0.239	0.213	0.029	2.636	1.038	0.337	1.827	2.457	3.472	1.644
106	0.003	0.052	0.138	0.295	0.438	0.071	3.338	0.980	0.415	2.696	3.525	4.094	1.397
107	0.003	0.329	0.498	0.074	0.082	0.011	1.943	0.913	0.253	1.255	1.838	2.338	1.082
108	0.003	0.138	0.501	0.161	0.123	0.071	2.484	1.097	0.541	1.720	2.216	3.162	1.442
109	0.000	0.284	0.539	0.123	0.041	0.011	1.955	0.819	0.133	1.378	1.899	2.362	0.984
110	0.000	0.146	0.426	0.209	0.198	0.018	2.516	1.025	0.292	1.743	2.328	3.343	1.600
111	0.000	0.089	0.258	0.131	0.333	0.187	3.269	1.275	0.158	2.119	3.561	4.311	2.192
112	0.000	0.033	0.127	0.164	0.337	0.337	3.816	1.131	0.201	3.039	4.016	4.758	1.718
113	0.011	0.258	0.569	0.093	0.048	0.018	1.988	0.850	0.161	1.456	1.914	2.348	0.892
114	0.000	0.172	0.550	0.183	0.086	0.007	2.205	0.851	0.240	1.641	2.095	2.647	1.006
115	0.000	0.052	0.292	0.202	0.314	0.138	3.194	1.154	0.044	2.176	3.268	4.145	1.969
116	0.011	0.235	0.569	0.093	0.082	0.007	2.045	0.856	0.142	1.519	1.953	2.388	0.868

TABLE 4.14--continued

Item	Omit	Percentage of Responses By Item 1	2	3	4	5	Mean	Stan Dev	P-Cor	Q1	Q2	Q3	IQR
117	0.007	0.153	0.651	0.097	0.067	0.022	2.147	0.840	0.058	1.645	2.025	2.406	0.761
118	0.007	0.108	0.640	0.164	0.067	0.011	2.226	0.773	0.215	1.717	2.105	2.492	0.774
119	0.011	0.086	0.475	0.194	0.191	0.041	2.621	1.022	0.107	1.838	2.358	3.423	1.584
120	0.003	0.089	0.295	0.183	0.314	0.112	3.063	1.191	0.399	2.037	3.112	4.065	2.027
121	0.011	0.029	0.093	0.149	0.348	0.367	3.939	1.081	-0.192	3.325	4.134	4.826	1.501
122	0.007	0.161	0.475	0.172	0.153	0.029	2.411	1.028	0.146	1.683	2.204	3.125	1.441
123	0.011	0.108	0.453	0.153	0.209	0.063	2.662	1.119	0.157	1.805	2.351	3.625	1.819
124	0.007	0.191	0.408	0.127	0.250	0.014	2.486	1.109	0.127	1.639	2.247	3.570	1.930
125	0.007	0.176	0.677	0.067	0.056	0.014	2.049	0.777	0.299	1.606	1.972	2.338	0.732
126	0.003	0.288	0.550	0.078	0.059	0.018	1.966	0.881	-0.002	1.363	1.880	2.333	0.969
127	0.011	0.104	0.374	0.161	0.288	0.059	2.821	1.142	0.110	1.880	2.593	3.850	1.970
128	0.014	0.247	0.558	0.108	0.052	0.018	2.022	0.862	0.129	1.496	1.939	2.380	0.884
129	0.007	0.037	0.254	0.205	0.393	0.101	3.267	1.067	0.056	2.327	3.490	4.126	1.798
130	0.003	0.183	0.411	0.217	0.161	0.022	2.424	1.035	0.072	1.659	2.263	3.198	1.539
131	0.011	0.157	0.584	0.179	0.063	0.003	2.162	0.778	0.120	1.653	2.076	2.500	0.846
132	0.007	0.142	0.228	0.161	0.318	0.142	3.090	1.299	0.117	1.963	3.279	4.167	2.204
133	0.011	0.134	0.550	0.168	0.119	0.014	2.321	0.907	0.232	1.704	2.153	2.833	1.129
134	0.011	0.097	0.232	0.176	0.419	0.063	3.121	1.138	0.486	2.145	3.436	4.062	1.917
135	0.003	0.123	0.569	0.187	0.097	0.018	2.315	0.878	0.180	1.720	2.157	2.790	1.069
136	0.000	0.239	0.509	0.153	0.082	0.014	2.123	0.917	0.187	1.520	2.011	2.506	0.985
137	0.003	0.067	0.449	0.191	0.191	0.097	2.800	1.124	0.232	1.904	2.458	3.705	1.801
138	0.003	0.093	0.292	0.254	0.337	0.018	2.894	1.035	0.528	2.032	2.941	3.816	1.784
139	0.003	0.059	0.262	0.161	0.471	0.041	3.172	1.054	0.427	2.221	3.531	4.059	1.838
140	0.003	0.119	0.288	0.243	0.318	0.026	2.842	1.081	0.599	1.948	2.869	3.800	1.851
141	0.014	0.138	0.224	0.142	0.411	0.067	3.045	1.216	0.579	1.979	3.407	4.065	2.086
142	0.011	0.056	0.187	0.202	0.479	0.063	3.310	1.030	0.590	2.518	3.601	4.117	1.598
143	0.014	0.074	0.250	0.138	0.464	0.056	3.178	1.107	0.588	2.182	3.560	4.090	1.907
144	0.014	0.119	0.224	0.187	0.355	0.097	3.087	1.209	0.493	2.062	3.290	4.081	2.019

	% who agreed	% who disagreed
34. While taking this instruction, they felt isolated and alone.	24.3	54.2
35. They seemed to learn very slowly with this type of instruction.	32.4	52.0
36. They felt that no one really cared whether they worked or not.	34.3	45.2

The students disagreed with the statements that:

1. All classes can be individualized.	16.0	67.4
2. All courses can be individualized.	12.2	71.[illegible]

Part III - Teacher Survey Data

Introduction

As a part of the Learning Styles Project, faculty at Fox Valley Technical Institute who had individualized instruction were surveyed to obtain their opinions and suggestions concerning individualized instruction. The purpose of the survey was to gather information which could be used along with student and other data in the development of an "ideal" individualized learning model.

Methodology

A survey was prepared by the researcher to identify faculty opinions concerning individualized instruction. The information contained in the survey came from previous surveys used in other studies by the researcher and from the philosophy and purposes of individualized instruction at FVTI. After the survey was prepared, it was presented to the faculty advisory committee for review. Their suggestions were incorporated into the survey.

Since most of the survey had been validated and tested for reliability in a previous study and since the population was similar, it was not reanalyzed for these attributes.

Multiple copies of the survey were prepared by the Word Processing Center for use.

A listing of the faculty to be surveyed came from the instructional supervisors of each division. They were asked to indicate who had individualized instruction in each division. A tabulation was

made and each teacher on the list was sent a copy of the survey. A total of 60 surveys were sent out and 55 or 91.7% of the teachers completed and returned the instruments. Two surveys arrived after the data were tabulated which precluded their inclusion in the rated section; however, their comments were included with the free comments. Of those not responding, one was in the hospital, one left FVTI, and the others misplaced their surveys.

Not all teachers answered each question with a checkmark, therefore the number of responses per question varied. The rated responses are contained in Table 4.15 in rank order of response. To facilitate the computation and analysis of the data, the following values and range intervals were used.

Agreement	Computational Value Assigned	Interval Limits
Strongly Agree	5	4.50 - 5.00
Agree	4	3.50 - 4.49
Uncertain	3	2.50 - 3.49
Disagree	2	1.50 - 2.49
Strongly Disagree	1	1.00 - 1.49

Ratings by the Teachers

Of the 43 items rated by the FVTI teachers, 28 items received a rating of 3.5 or higher indicating that the teachers agreed with the item. The teachers were uncertain about 13 items and they disagreed with two items, see Table 4.15.

The teachers strongly agreed that:

1. The instructor has to be very familiar with the individualized units before actual instruction begins.

The teachers agreed that:

1. A variety of media and instructional strategies must be employed in individualized instruction.

2. The instructor has a great deal to do with the success or failure of a unit.

3. Individualized instruction enables the learner to move with greater speed through those activities with which he is more familiar.

4. The role of the instructor changes in an Individualized Instruction Program.

5. Units can be used by individual students wishing to study by themselves.

6. Many of your students studying via individualized techniques come to you for assistance.

7. The learning environment changes when a program of individualized instruction is implemented.

8. Poor readers do not react well to the units.

9. Some students prefer other means of learning than the textbook and lecture.

10. Upon completion of each unit, the student should complete a teacher administered quiz which would be graded by the teacher for feedback.

11. The audiovisual materials (slides, references, etc.) are very helpful and add to understanding of the unit.

12. The student study guide provides the students with a good outline of the things they will do in the units.

13. Individualized instruction allows the learner to be freed from the pace of his classmates.

14. Individualized instruction allows the student to grasp material from other means than the textbook and the lecture.

15. Individualized instruction gives the student the opportunity to receive individual consultation during school time.

16. The learning activities are very appropriate in developing understandings, knowledges and skills needed by a beginning employee in the occupational area.

17. In individualized instruction the objectives or goals of the instruction must be clearly stated in measurable terms.

18. An individualized curriculum allows each student to progress at his own best rate of speed commensurate with his abilities, interests, needs, and motivational patterns.

19. The units for the course(s) are very appropriate.

20. Students need to be motivated by the teacher in order to study the unit.

21. The information sheets provide the student with a good idea of the things he will need to learn in the unit.

22. Individualized instruction allows the learner to concentrate in depth on the subject matter he needs. He can spend as much time as he needs and desires to learn a concept or master a skill.

23. The project assignments provide ample opportunity for the students to practice or demonstrate their knowledge or skill for a sub-objective or objective of the unit.

24. An advantage of individualized instruction is that it allows some students more time to finish a course.

25. The orientation (or introduction) section of the unit provides the students with a good understanding of the unit.

26. Learning deficiencies, especially reading problems, are easily detected in an individualized program.

27. The learner becomes more active and involved in the learning process in an individualized program.

The teachers were uncertain whether:

1. Individualized instruction and learning can occur only when the curriculum and the materials and activities are organized for self-pacing following a predetermined system.

2. The units should be studied throughout the year.

3. Individualized instruction enables the student to increase his employability. Not only does he master each concept and skill before graduating, he enters the labor market when he is finished with his requirements--not necessarily at the end of the semester.

4. The unit behavioral objectives are complete, accurate and appropriate.

5. The units and reference materials which were developed are complete and accurate.

6. Individualized instruction gives the student a greater opportunity to succeed.

7. Many students complete courses earlier than the traditional time allotted for them.

8. The student self evaluation instruments are adequate in determining whether the students master the unit.

9. An entire class should not be given individualized material but rather selected individuals who are interested in and capable of completing the assignments should be given units.

10. Teacher administered quizzes should be administered weekly.

11. All areas of instruction can be individualized.

12. Students using the units felt lost without a standard with which they could compare themselves.

13. A study guide should not be included in the unit. The information on the guide should be dispersed throughout the unit.

The teachers disagreed that:

1. Most students are capable of disciplining themselves to study on an individualized basis.

2. Class enrollments can be larger when taught via individualized instruction.

TABLE 4.15

EVALUATION OF INDIVIDUALIZED INSTRUCTION AT FOX VALLEY TECHNICAL INSTITUTE BY THE TEACHERS USING THIS METHOD OF INSTRUCTION

Items Evaluated	Number in Agreement SA	A	U	D	SD	Mean
1. Instructors need to be very familiar with the units before actual instruction begins. . .	41	9	2	1		4.70
2. A variety of media and instructional strategies must be employed in individualized instruction..	24	23	5			4.37
3. The instructor has a great deal to do with the success or failure of a unit	27	17	6	2		4.33
4. Individualized instruction enables the learner to move with greater speed through those activities with which he is more familiar.	20	28	1		1	4.32
5. The role of the instructor changes in an Individualized Instruction program.	22	22	3	3		4.26
6. Units can be used by individual students wishing to study by themselves.	23	24	3	2	1	4.25
7. Many of your students studying via individualized techniques come to you for assistance. .	20	22	3	2	1	4.21
8. The learning environment changes when a program of individualized instruction is implemented. .	15	31	3	1		4.20
9. Poor readers do not react well to the units.	21	20	7	2		4.20

TABLE 4.15--continued

Items Evaluated	Number in Agreement SA	A	U	D	SD	Mean
10. Some students prefer other means of learning than the textbook and lecture.	14	35	4			4.19
11. Upon completion of each unit, the student should complete a teacher administered quiz which would be graded by the teacher for feedback.	27	11	10		3	4.16
12. The audiovisual materials (slides, references, etc.) are very helpful and add to understanding of the unit.	18	21	9	1		4.14
13. The student study guide provides the students with a good outline of the things they will do in the units.	15	28	6	2		4.10
14. Individualized instruction allows the learner to be freed from the pace of his classmates.	15	30	4	3		4.10
15. Individualized instruction allows the student to grasp material from other means than the textbook and the lecture. .	16	27	4	4		4.08
16. Individualized instruction gives the student the opportunity to receive individual consultation during school time.	14	27	6	3		4.04
17. The learning activities are very appropriate in developing understandings, knowledges and skills needed by a beginning employee in the occupational area.	14	22	10	2		4.00
18. In individualized instruction the objectives or goals of the instruction must be clearly stated in measurable terms.	13	28	7	2	1	3.98

TABLE 4.15--continued

Items Evaluated	Number in Agreement SA	A	U	D	SD	Mean
19. An individualized curriculum allows each student to progress at his own best rate of speed commensurate with his abilities, interests, needs, and motivational patterns.	13	27	6	2	2	3.94
20. The units for the course(s) are very appropriate.	12	27	9	3	1	3.88
21. Students need to be motivated by the teacher in order to study the unit.	17	20	7	6	2	3.95
22. The information sheets provide the student with a good idea of the things he will need to learn in the unit.	9	28	10	2	1	3.84
23. Individualized instruction allows the learner to concentrate in depth on the subject matter he needs. He can spend as much time as he needs and desires to learn a concept or master a skill.	13	20	8	4	2	3.81
24. The project assignments provide ample opportunity for the students to practice or demonstrate their knowledge or skill for a subobjective or objective of the unit.	13	21	13	2	2	3.80
25. An advantage of individualized instruction is that it allows some students more time to finish a course.	13	18	11	6	2	3.68
26. The orientation (or introduction) section of the unit provides the students with a good understanding of the unit. . .	7	25	13	6	1	3.60

TABLE 4.15--continued

Items Evaluated	Number in Agreement SA	A	U	D	SD	Mean
27. Learning deficiencies, especially reading problems, are easily detected in an individualized program.	11	17	12	8	2	3.54
28. The learner becomes more active and involved in the learning process in an individualized program.	7	21	14	7	1	3.52
29. Individualized instruction and learning can occur only when the curriculum and the materials and activities are organized for self-pacing following a predetermined system.	10	17	9	8	3	3.49
30. The units should be studied throughout the year.	6	14	17	4	2	3.42
31. Individualized instruction enables the student to increase his employability. Not only does he master each concept and skill before graduating, he enters the labor market when he is finished with his requirements--not necessarily at the end of the semester.	7	21	8	11	3	3.36
32. The unit behavioral objectives are complete, accurate and appropriate.	2	23	18	5	2	3.36
33. The units and reference materials which were developed are complete and accurate. .	4	18	10	10	1	3.33
34. Individualized instruction gives the student a greater opportunity to succeed. . .	9	13	15	7	4	3.33
35. Many students complete courses earlier than the traditional time allotted for them. . .	6	20	8	14	3	3.24

TABLE 4.15--continued

Items Evaluated	Number in Agreement SA	A	U	D	SD	Mean
36. The student self evaluation instruments are adequate in determining whether the students master the unit.	5	13	18	11	5	3.04
37. An entire class should not be given individualized material but rather selected individuals who are interested in and capable of completing the assignments should be given units. .	3	7	15	20	3	2.73
38. Teacher administered quizzes should be administered weekly.	5	5	13	20	4	2.72
39. All areas of instruction can be individualized.	4	7	14	13	11	2.59
40. Students using the units felt lost without a standard with which they could compare themselves.		13	17	13	5	2.58
41. A study guide should not be included in the unit. The information on the guide should be dispersed throughout the unit.	3	7	13	19	8	2.54
42. Most students are capable of disciplining themselves to study on an individualized basis.	2	10	4	22	13	2.33
43. Class enrollments can be larger when taught via individualized instruction. .	1	3	3	15	26	1.71

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter contains a summary of the major findings from the University of Wisconsin - Stout subcontract, and the teacher, student, and supervisory surveys conducted at Fox Valley Technical Institute. It also includes conclusions based upon the findings and recommendations.

Summary of Major Findings

The major findings of the study were as follows:

1. The learning styles instrument developed as a part of the study determined an individual's learning style on the following dimensions: concrete/symbolic; structured/unstructured.

2. Students at Fox Valley Technical Institute who participated in the study enrolled in programs of study that matched or complemented their particular style of learning.

3. Students viewed themselves as functioning effectively in a learning environment that reflected a mix or composite of structured/unstructured learning styles.

4. Students who participated in the study at Fox Valley Technical Institute tended to have concrete learning styles.

Profile of Typical FVTI Students*

The typical FVTI student would prefer to:

1. Do well in school.

2. Receive a grade on the basis of how hard he tried.

3. Be well prepared for a job after graduation.

4. Take chances on getting a higher or lower grade at the end of the course.

5. Be successful in finishing a school assignment.

6. Receive excellent grades because of a great deal of ability.

7. Do better than most of his classmates.

8. Work slowly with great thoroughness.

*The numbers do not indicate a ranking of these items.

9. Complete his/her assignments while at school.

10. Attend classes which require very little reading and a lot of discussion by the teacher.

11. Attend a class where he/she can express ideas, talents and skills.

12. Attend a class where he/she can perform activities or do things.

13. Attend a class where he/she competes only with himself/herself.

14. Attend a class which has high work standards.

15. Attend a class where he/she can come and go as he/she pleases.

16. Attend a class where he/she can decide how the work is to be done.

17. Attend a class which permits him/her to take days off when he/she wants to.

18. Attend a class which meets in the mornings.

19. Attend a class which only meets several days a week.

20. Attend classes which allow him/her to work with tools, materials, and equipment.

21. Attend classes in a learning situation that allows him/her to interact with fellow classmates on a group basis.

22. Attend classes which teach him/her job skills.

23. Attend classes that require a great deal of verbal (talk) exchange.

24. Attend classes which allow him/her to learn at his/her own best rate and to take tests whenever he/she feels ready to take them.

25. Complete courses within a group environment.

Other Segments of Students

30.8% would prefer to complete courses via self-instructional techniques with films, slides, and tapes always available.

15.9% of the students prefer to learn by themselves without a teacher nearby.

46.1% of the students prefer to attend classes where they can interact with a small group of students or work 1 on 1 with the teacher.

19.4% of the students would prefer to attend classes which require them to do a great deal of reading.

71.6% of the students prefer to attend classes that allow them to learn at their own best rate and to take tests whenever they feel they are ready.

84.3% of the students would prefer to review audiovisual materials during class in the classroom and not go to the learning resources center.

Human Traits of Selected FVTI Students

The typical FVTI student always:

1. Gets a great deal of satisfaction when he/she does something better than what is expected of him/her.

The typical FVTI student usually:

1. Feels that most of his/her school subjects are useful.
2. Likes to make the best grades possible.
3. Likes to compete with other students for grades.
4. Likes to plan his/her own study activities.
5. Likes being with people in social gatherings.
6. Gets along with his/her fellow students.
7. Enjoys reading non-school books.
8. Likes to plan his/her activities in advance.
9. Enjoys reading.
10. Enjoys viewing slides.
11. Enjoys laboratory work.
12. Enjoys his/her teachers at FVTI.
13. Is more alert in the mornings.
14. Enjoys working by himself/herself.
15. Enjoys class discussions.

16. Likes classes where he/she is tested out on his/her actual skills rather than by paper and pencil tests.

The typical FVTI student sometimes:

1. Finds that it is difficult for him/her to keep interested in most of his/her school subjects.
2. Has a hard time concentrating on the subjects during class time.
3. Finds that his/her mind tends to wander when he/she sits down to study.
4. Likes to study.
5. Learns slowly.
6. Does not like to compete with other students for grades.
7. Can read for long periods of time without tiring.
8. Has trouble getting his/her school assignments in on time.
9. Feels that most of his/her subjects are a complete waste of time.
10. Enjoys classroom work rather than laboratory work.
11. Enjoys working in a large group.
12. Likes to attend classes which requires assignments to be due on certain dates.

Attitude Toward Individualized Instruction

The students agreed that:

1. Through individualized learning, the teacher has more time to give to the individual needs of students.
2. Most students like to be responsible for their education.
3. Individualized learning allows one to work at his own speed.
4. Individualized learning allows one to study in depth in areas of interest.
5. Since students can review slides and other references as often as they wish in individualized learning, students should achieve a better understanding of the subject.

6. Increased student/teacher contact in individualized study may help the student understand the subject better than with traditional classroom instruction.

7. Students may learn less with individualized instruction if they are given the option to choose "what" and "how much" they study.

The students were uncertain whether:

1. Individual learning is based on the same learning principles as good traditional classroom instruction.

2. Individualized assignments may hinder one's social development.

3. It is enjoyable to study subjects on one's own.

4. They would volunteer to enroll if some subjects were available on an individualized learning basis.

5. Individualized learning provides a better way of grading students since each student is evaluated according to his ability and personal progress.

6. Working on one's own is boring.

7. Individualized assignments encourage students to do less work than with traditional classroom instruction.

8. Individualized learning should result in a better education for most students.

9. One will work harder if he is studying the subject by himself.

10. They usually perform better when they attend group instruction and am competing with fellow students.

11. They prefer to attend classes in a large group.

The students disagreed with the statements:

1. Regardless of ability, all students should be graded the same.

2. Most students do not care what method of course organization is used in their educational pursuits.

Student Attitude Toward Individualized Instruction at FVTI

The students agreed that:

1. Examinations should be administered only after a unit is completed by the student.

2. Guidelines and suggested due dates for the completion of individual study units and projects should be given to the students at the beginning of a course.

3. The teacher/student relationship is good with individualized instruction.

4. Teachers should meet with the slower students more often and help them with problems.

5. In some individualized classes, it is desirous to work with other students or people.

6 Instructors should go through the Individualized Study Units with the class.

7. A presentation of an individual study unit should be made by the instructor.

8. A discussion with the teacher should be held following the presentation.

9. After the discussion, students should then complete the Individual Study Units.

10. If tapes, slides, etc., are a part of an individualized course, they should be in the same room as where the instruction takes place.

11. It is very hard to be self-motivated to complete units when no due dates are established.

12. Instructors should indicate target dates when projects are to be completed.

13. Class discussions would add to understanding of the units.

14. Instructors should personally talk with those students who are falling behind in the class assignments.

15. Course grades should be based upon quality of work and not the quantity or numbers of units completed.

16. Space should be provided for small group discussions apart from the classroom.

17. Course grades should be based upon a happy median between quality and quantity of work completed.

18. Provision should be made for regularly scheduled discussion periods with the teacher.

19. The teacher's technique of use of a unit or package is critical in the success or failure in teaching.

The students were uncertain whether:

1. A lot of cheating takes place with this type of instruction.

2. They did not learn much with this type of presentation (or learning): Reason why?

3. They only have to remember the materials to pass the unit test.

4. They did not understand the units.

5. Teacher help was not always available.

6. The final exam did not count.

7. Group discussion was limited.

8. Many of the exams were of the paper and pencil types in this class which are not too meaningful.

9. In the technical areas, they were always tested out on their acquired mechanical skills by the instructor.

10. A lot of emphasis was placed on the actual performance of a skill rather than performance on a paper and pencil test.

11. They personally have seen students trade answers for their unit self-exams.

12. Self-exams should not count toward course grades.

13. They personally knew of students who had the answers to unit exams or to the final post-test exams.

14. They stood in line a lot to have their materials graded.

15. Too much of my learning has been based on reading.

16. Instructors are not familiar with all areas of the individualized programs.

17. Many students wait until the end of the term or semester and then hand in all their assignments at one time.

18. Much of the information in the Individual Study Units is outdated and is hard to relate to the shop (laboratory) work.

19. Most teachers do not push the students who lack motivation or drive.

20. Students should be required to attend school a set number of hours per week.

21. Attendance of instructor presentations should be optional and not required.

22. During the completion of the Individual Study Units, teachers should come around the room and ask questions.

23. They received more individual help in individualized courses than in non-individualized courses.

24. They like to study units on a due date basis.

25. Instructors should walk around the room and ask the students questions.

26. Students should not have alternative choices in completing projects and class assignments.

27. Attendance should not be required at FVTI.

28. They don't remember a thing when they read a package or individual study unit.

29. There are ample slides, tapes, and other audiovisual materials for use with the Individual Study Units or Packages.

30. This method of instruction makes learning too mechanical.

31. They had difficulty reading the written material that was used.

32. They felt frustrated by the instructional situation.

33. This is a poor way for me to learn skills.

34. While taking this instruction, they felt isolated and alone.

35. They seemed to learn very slowly with this type of instruction.

36. They felt that no one really cared whether they worked or not.

The students disagreed with the statements that:

1. All classes can be individualized.

2. All courses can be individualized.

Ratings by the Teachers

The teachers strongly agreed that:

1. The instructor has to be very familiar with the individualized units before actual instruction begins.

The teachers agreed that:

1. A variety of media and instructional strategies must be employed in individualized instruction.

2. The instructor has a great deal to do with the success or failure of a unit.

3. Individualized instruction enables the learner to move with greater speed through those activities with which he is more familiar.

4. The role of the instructor changes in an Individualized Instruction Program.

5. Units can be used by individual students wishing to study by themselves.

6. Many of your students studying via individualized techniques come to you for assistance.

7. The learning environment changes when a program of individualized instruction is implemented.

8. Poor readers do not react well to the units.

9. Some students prefer other means of learning than the textbook and lecture.

10. Upon completion of each unit, the student should complete a teacher administered quiz which would be graded by the teacher for feedback.

11. The audiovisual materials (slides, references, etc.) are very helpful and add to understanding of the unit.

12. The student study guide provides the students with a good outline of the things they will do in the unit.

13. Individualized instruction allows the learner to be freed from the pace of his classmates.

14. Individualized instruction allows the student to grasp material from other means than the textbook and the lecture.

15. Individualized instruction gives the student the opportunity to receive individual consultation during school time.

16. The learning activities are very appropriate in developing understandings, knowledges and skills needed by a beginning employee in the occupational area.

17. In individualized instruction the objectives or goals of the instruction must be clearly stated in measurable terms.

18. An individualized curriculum allows each student to progress at his own best rate of speed commensurate with his abilities, interests, needs, and motivational patterns.

19. The units for the course(s) are very appropriate.

20. Students need to be motivated by the teacher in order to study the unit.

21. The information sheets provide the student with a good idea of the things he will need to learn in the unit.

22. Individualized instruction allows the learner to concentrate in depth on the subject matter he needs. He can spend as much time as he needs and desires to learn a concept or master a skill.

23. The project assignments provide ample opportunity for the students to practice or demonstrate their knowledge or skill for a sub-objective or objective of the unit.

24. An advantage of individualized instruction is that it allows some students more time to finish a course.

25. The orientation (or introduction) section of the unit provides the students with a good understanding of the unit.

26. Learning deficiencies, especially reading problems, are easily detected in an individualized program.

27. The learner becomes more active and involved in the learning process in an individualized program.

The teachers were uncertain whether:

1. Individualized instruction and learning can occur only when the curriculum and materials and activities are organized for self-pacing following a predetermined system.

2. The units should be studied throughout the year.

3. Individualized instruction enables the student to increase his employability. Not only does he master each concept and skill before graduating, he enters the labor market when he is finished

with his requirements--not necessarily at the end of the semester.

4. The unit behavioral objectives are complete, accurate and appropriate.

5. The units and reference materials which were developed are complete and accurate.

6. Individualized instruction gives the student a greater opportunity to succeed.

7. Many students complete courses earlier than the traditional time allotted for them.

8. The student self evaluation instruments are adequate in determining whether the students master the unit.

9. An entire class should not be given individualized material but rather selected individuals who are interested in and capable of completing the assignments should be given units.

10. Teacher administered quizzes should be administered weekly.

11. All areas of instruction can be individualized.

12. Students using the units felt lost without a standard with which they could compare themselves.

13. A study guide should not be included in the unit. The information on the guide should be dispersed throughout the unit.

The teachers disagreed that:

1. Most students are capable of disciplining themselves to study on an individualized basis.

2. Class enrollments can be larger when taught via individualized instruction.

Conclusions and Implications

The following conclusions and implications were drawn from analyzing the data:

1. The learning styles instrument developed as a part of the study can be used by teachers to determine an individual's learning style on the following dimensions: concrete/symbolic; structured/unstructured.

2. Students tend to enroll in vocational-technical programs of study that match or complement their particular style of learning.

3. Many of the students surveyed at Fox Valley Technical Institute did not rate the concrete/symbolic; structured/unstructured dimensions to either extreme which indicates that they desire a mix or composite of both learning styles.

4. Students who participated in the study at Fox Valley Technical Institute tended to have concrete learning styles.

5. The variance of scores within groups suggests the need for offering alternative learning and teaching modes within classes and programs. Individuals placing at the extreme ends of a continuum may be placed in a conflict situation if one instructional mode is employed. True individualization of instruction should consider all variables of the learner and provision should be made to provide the learner with optimum learning conditions.

6. Learning style is a measurable and definite construct as it relates to effective and efficient teaching and learning. In order to offer optimum conditions for learning and the reduction of conflict or dissonance in a classroom, teachers will have to give more emphasis to a student's learning style and to his/her teaching style.

7. A student's learning style changes and/or can be changed.

Composite Conclusions and Implications from the FVTI Surveys

The following composite conclusions and implications were formulated from the student, teacher, and supervisory findings generated by the multiple surveys given at Fox Valley Technical Institute.

8. Teachers can be effective with individualized instruction techniques if they:

   A. Understand their role with this method of instruction.

   B. Are properly trained to teach on an individualized basis.

   C. Are committed to the philosophy of individualized instruction.

   D. Take an active part in the development of audiovisual and curricular materials.

   E. Know what concepts, principles, or skills are to be developed in the students.

   F. Incorporate a wide variety of motivational techniques into their course or program.

G. Are provided time to work with the students individually.

H. Are student oriented. (people oriented)

I. Provide structure for those students who need it.

J. Make a concerted effort to meet with the slower students and provide them with needed help.

K. Base course grades on speed and quality of work according to predetermined criteria.

L. Provide alternative forms of learning to meet a given student performance objective.

9. Individualization of instruction is effective if the students:

A. Are properly oriented and acclimated to this type of instruction.

B. Can set their own goals.

C. Are actively involved.

D. Can proceed at their own pace.

E. Can evaluate their own progress.

F. Are interested in the subject and if the subject meets the students' needs and is geared to their abilities.

G. Are self-motivated.

H. Can attend classes on a volunteer basis.

10. Individualized instructional units are an effective means of teaching if:

A. They are self-instructional.

B. The lessons contain student performance objectives.

C. Different learning materials are available to accommodate different learning styles.

D. Adequate materials and facilities are made available.

E. Content relies on reality and actual experiences.

F. They involve the interaction of persons, procedures and materials. (persons, processes and properties)

G. The teacher is actively involved.

H. The courses or programs, if possible, provide for open-entry/open-exit.

11. An individualized curriculum allows each student to progress at his own best rate of speed commensurate with his abilities, interests, needs, and motivational patterns if:

A. Appropriate audiovisual and curriculum materials are available.

B. The student is interested in studying on a totally individualized basis.

C. The materials are written and portrayed* at the ability level of the student. (*The hardware must also be at the level of the student.)

D. The subject being studied is of interest to the student.

E. The whole course or program is individualized.

F. The instructor provides the personal attention and motivation necessary for the student to complete the course or program.

General Conclusions and Implications

12. Individualized instruction has a definite role and place at FVTI. Many students and teachers consider it as a viable alternative form of learning.

13. Individualized instruction IS NOT synonomous with "Individual Study Units" or "Packets." It is the allowing of the student to proceed at his own pace according to his interests, needs and abilities.

14. The vast majority of FVTI students have a good attitude toward individualized instruction.

15. Totally self-structured courses do have a place at FVTI but attendance should be on a volunteer basis.

16. Alternative forms of learning to meet a given objective should be expanded at FVTI. Since the students do not all learn the same way and since they prefer a variety of alternative forms of learning as indicated by their profile, a concerted effort should be made to meet their needs.

17. Students prefer a variety of instructional methods within which

to complete courses. Depending on the students served and the materials being covered, the instructional methods made available to a student may vary from totally self-paced to a combination of lecture-discussion-demonstration.

18. Audiovisual materials are an essential component of an individualized program. Since no two students derive meaning in exactly the same way, it is essential to provide instruction which can reinforce the different senses: i.e., tactile, visual, auditory, savory, etc.

19. Poor readers do not react well to a totally packaged course; i.e. one which does not have alternative forms of learning available. Teachers indicated that many units are based on reading and that some students view these courses as "correspondence courses." The teachers estimated that 40 per cent (median response) of their students were "poor readers." This depends on what we define as a "poor reader." Many students probably read below their grade level but should not in fact be considered a poor reader.

Conclusions Involving Procedures for Individualizing Instruction

20. To be successful with individualized instruction, more alternatives to learning than just reading are needed.

21. A variety of media and instructional strategies must be employed by the instructor in individualizing a course or program. Many of the FVTI students do not prefer reading as the only alternative to learning. They view this as a correspondence course. In addition, basing instruction on reading alone violates many students' learning styles.

22. Many students are not self-motivated and cannot work or study alone, therefore provision should be made to allow them to work in groups.

23. Students need to be motivated by the teacher in order to study on an individualized or self-paced basis. Most students are not capable of disciplining themselves to study on an individualized basis.

24. Teachers should make a concerted effort to meet with the slower students to provide them with needed help.

25. Many students need structure such as required attendance, due dates for assignments, definite dates for testing, etc. in order to be successful, therefore, guidelines and suggested due dates for the completion of units, projects, or skills should be developed by the instructor and given to the students at the beginning of a term or semester. If a student falls behind, the

teacher should meet with the student to determine why he is not completing the course or program according to some predetermined schedule.

NOTE: The student should not be penalized for falling behind. However, with the present FVTI system, students need to complete a course by the end of the semester in order to enter other classes.

26. Block time scheduling of classes should be investigated. Since students prefer to attend a class which meets only several days a week, perhaps larger blocks of time could be arranged to accommodate the students.

27. Many of the course offerings should be made available in the mornings since most students are more alert in the mornings.

28. School attendance should be stressed to the students. While many of the students have a traditional attitude toward attendance, many others do not. They prefer to come and go as they please, to take days off when they want to etc. Bad school attendance habits will carry over to bad job attendance habits.

29. A good monitoring and record keeping system is needed by the teacher.

30. Some system needs to be worked out whereby students who receive incompletes can make this up without being penalized from going from individualized open-ended classes to non-individualized non-open-ended classes.

31. To be successful the student to teacher ratio may need to be decreased in some program areas.

32. Many students prefer a presentation discussion of a unit by the teacher while others do not. The FVTI faculty should survey the students entering and exiting a course to determine how they like to learn and to use this data as input for making course revisions as to alternatives made available for student learning.

33. For courses which are individualized, provisions should be made by the instructor for regularly scheduled discussion periods with the students.

Conclusions Pertaining to Evaluation

34. Upon completion of each task, skill or unit, student performance should be evaluated. This could be in the form of unit tests, projects completed, or actual performance of the task or skill. Primary emphasis should be placed upon the psychomotor domain of skill performance and mastery and not upon the cognitive domain

of knowledge and recall.

35. Evaluation of the student should be based primarily upon his/her actual skills rather than paper and pencil tests.

36. Course grades should be based upon speed and quality of work according to predetermined criteria and not upon the quantity of work or units completed.

37. Better controls over examinations are needed. Care should be exercised to guard against the theft or loss of examinations. Different forms of examinations to test a given objective should be given.

Conclusions Regarding the Role of the Instructor

38. The role of the instructor changes with individualized instruction. He is not a presenter of information but is a coordinator of learning. He is a professional tour guide assisting the students to discover or to develop a given skill. Most of all he is a stimulator, motivator, and a reinforcer of learning.

39. Students can study by themselves and learn in an individualized setting, however as the teachers pointed out it depends on the course, teacher, and student. Some courses lend themselves to individual study more readily than others. In most courses the teachers recommended human reinforcement and student-student and student-teacher interaction.

40. The instructor has a great deal to do with the success or failure of an individualized course or program. In the opinion of some teachers and supervisors it takes more skill to teach under the individualized method.

41. Teachers need to motivate the students by a variety of means in order for students to complete a course or program.

42. The teacher must be student oriented and learner centered to be successful.

43. The instructor must be committed to this form of learning and exhibit enthusiasm regarding it.

44. A successful teacher provides diverse methods of learning such as self-paced, small group seminars, demonstrations, lecture-discussions, laboratory work, projects, etc. in order to meet student needs.

Conclusions on Individualized Instruction Philosophy

45. The learner becomes more active and involved in the learning process in an individualized course or program. Even though the teachers agreed with this statement many pointed out the following:

    A. Depends on the course, student, and teacher.

    B. If the student sits at a desk and completes packages or units, he is less active and involved in his learning; in fact he is passive.

    C. Appropriate active involvement activities must be incorporated into an individualized program.

46. Class enrollments may need to be smaller in some areas when the course or program is taught on an individualized basis. Instructors have recommended a median of 15 students in classes taught on an individualized basis.

47. Individualized instruction allows the learner to be freed from the pace of his classmates. The fast students can move ahead and finish the course or program early while the other students can proceed at their own pace.

48. Individualized instruction gives the student the opportunity to receive individual consultation during class time. Small group or 1:1 help is available whenever the student needs it. The teachers pointed out though that if the class size is too large, the number of contacts per student decreased. Also for some programs it is practically impossible to provide 1:1 consultation and still evaluate student skill performance under the present school setting.

Conclusions Pertaining to Materials Development

49. An individualized learning unit should contain the following:

    A. Orientation to the unit, course or program

    B. A listing of the performance objectives

    C. A study guide

    D. Information sheets

    E. Inventories or self-tests

    F. Projects

50. If good textbooks and other reference books are available, they should not be reproduced in the form of a unit or package.

51. The learning activities of a course or program need to be varied in order to meet the individual needs of each student.

52. In individualized instruction the objectives or goals of instruction must be clearly stated in measurable terms. This is essential for any instruction but more so with individualized since students are all moving at their own pace.

53. The materials used in an individualized setting must be interesting to the students.

Recommendations

Based upon the summary of findings and conclusions of this study, the following recommendations were formulated.

1. The flow chart models for the development of individualized materials and for the personalization of instruction should be implemented at Fox Valley Technical Institute on an experimental basis during Phase II of this project.

2. The state staff and Fox Valley Technical Institute should continue to support the learning styles project so that the investigation of learning styles and its interaction with other learner variables can be continued.

3. The learning styles constructs used in the investigation should be expanded during Phase II to include other possible styles applicable to vocational-technical education.

4. Instrumentation other than paper and pencil tests or inventories should be developed to measure a student's learning style.

5. Further exploratory work on the use of a computer based management system to determine the type of learning experiences appropriate for the student should be explored during Phase II. At the present time, it is recommended that the Cognitive Styles Map of Oakland Community College be used until Fox Valley Technical Institute can develop its own system.

6. The staff at Fox Valley Technical Institute on a volunteer basis should be "mapped" to identify their cognitive teaching styles.

7. A selected group of students at Fox Valley Technical Institute should be mapped as to their cognitive learning styles.

8. The counselors at Fox Valley Technical Institute should be "mapped" to identify their counseling styles.

9. The administrators should be "mapped" at Fox Valley Technical Institute to identify their administrative style.

10. Since many of the Fox Valley Technical Institute summer conference participants are interested in implementing the personalized educational approach (PEP), a pilot study should be implemented this fall to test out the Fox Valley Technical Institute PEP models.

11. An inservice workshop should be held in the fall of 1974 to review with the Fox Valley Technical Institute staff the results of the pilot study and to orient additional staff to the PEP program. Dr. Joseph Hill and Dr. Derek Nunney should be contracted to conduct a PEP session for the staff.

12. The implementation of the PEP program at Fox Valley Technical Institute should be on a strictly voluntary basis.

13. A commitment should be made by Fox Valley Technical Institute to continue to support this program.

14. If learning styles are assessed and determined, educators must develop the strategies to compliment the various styles in order to achieve optimum learning development.

Where to go from here

Fox Valley Technical Institute is in an envious and unique position to forge ahead as a pioneer and leader in Wisconsin and the nation in providing instruction which meets the needs of students. The faculty has been receptive to change as evidenced by the increasing desire of instructors to provide alternative approaches to learning.

It will not be difficult to implement the PEP program at Fox Valley Technical Institute on an experimental basis. Already 30% of the courses are individualized and others are open-entry; open-exit. The staff overall is of a high caliber, enthusiastic and well versed on the techniques of individualized instruction. Should the school desire to go this way, the following will be needed during Phase II of this project:

1. An independent consultant-director to work with the staff in the development of additional materials in the personalizing of their programs.

2. The development of a comprehensive battery of diagnostic inventories to be administered to the Fox Valley Technical Institute staff and students. (Many of these are available

from OCC providing that the present consultant is retained).

3. The establishment of a counseling/testing center wherein the diagnostic inventories can be administered to students. This would not require additional staff as the counselors could be trained to run this center which could be staffed by a trained aide.

4. A computer program would need to be developed which could provide the maps for the students, staff, counselors, aides, [redacted] administrators.

5. A system needs to be implemented wherein all diagnostic data generated by the testing center would be available to all staff at Fox Valley Technical Institute.

6. A comprehensive training session will need to be held for teachers, counselors, administrators and aides at Fox Valley Technical Institute.

7. A learning laboratory should be organized which would provide additional diagnostic analysis and specific help for those having learning problems. This would include the present reading specialists but also some subject matter specialists.

8. A concerted effort should be made to accommodate the present teaching styles of teachers. Each teacher can be optimally utilized according to his style under the PEP program.

9. Individualization of instruction at Fox Valley Technical Institute will be enhanced when a PEP program is implemented in conjunction with it.

10. A special course taught by administrators and counselors on the understanding of student learning styles and teaching styles needs to be implemented.

11. Each course at Fox Valley Technical Institute should be evaluated to identify the learning styles and the materials preferred by the students.

BIBLIOGRAPHY

Anderson, Gary. "Effects of Classroom Social Climate on Individual Learning," American Educational Research Journal, 1970, Vol. VII,pp. 135-152.

Anderson, Richard C. "Control of Student Mediating Processes During Verbal Learning and Instruction," Review of Educational Research, 1970, Vol. 40, No. 3, pp. 349-369.

Anderson, Richard C., Kulhavy, Raymond W., and Andre, Thomas. "Conditions Under Which Feedback Facilitates Learning from Programmed Lessons," Journal of Educational Psychology, 1972, Vol. 63, No. 3, pp. 186-188.

Aspy, David N. and Roebuck, Flora N. "An Investigation of the Relationship Between Student Levels of Cognitive Functioning and the Teacher's Classroom Behavior," The Journal of Educational Research, 1972, Vol. 65, No. 8, pp. 365-368.

Baldwin, A. L. Theories of Child Development. New York: John Wiley & Son's, 1967.

Becker, J., Doctor, R. M., Miranda, M. and Wallace, J. "Analytic-Perceptual Style and Verbal Conditioning," Perceptual and Motor Skills, 1971, Vol. 32, pp. 631-636.

Beller, E. K. "Methods of Language Training and Cognitive Styles In Lower Class Children." Paper read at the American Educational Research Association, Annual meeting at New York City, February, 1967.

Beswick, David G. and Tallmadge, G. Kasten. "Reexamination of Two Learning Style Studies in the Light of the Cognitive Process Theory of Curiosity," Journal of Educational Psychology, Vol. 62, No. 6, 1971, pp. 456-462.

Bigge, M. L. Learning Theories for Teachers. New York: Harper and Row, 1964.

Bloom, Benjamin S. Taxonomy of Educational Objectives: Handbook I: Cognitive Domain. New York: David McKay Company, Inc., 1956.

Bloom, Benjamin S. "Testing Cognitive Ability and Achievement." Handbook of Research on Teaching. ed. N. L. Gage. Chicago: Rand McNally and Company, 1963.

Bodden, Jack L., Osterhouse, Robert, and Gelso, Charles J. "The Value of a Study Skills Inventory for Feedback and Criterion Purposes in an Educational Skills Course," The Journal of Educational Research, 1972, Vol. 65, No. 7, pp. 309-311.

Briggs, Lloyd D. "What will Career Education Demand of You?" Technical Education, Jan. 1973, pp. 85-86.

Brodbeck, May. "Logic and Scientific Method In Research on Teaching." Handbook of Research on Teaching. ed. N. L. Gage. Chicago: Rand McNally and Company, 1963.

Bruner, J. S. "On Cognitive Growth II." In Bruner, J. S., Oliver, R. and Greenfield, P. Studies in Cognitive Growth. New York: John Wiley, 1966. (a)

Bruner, J. S. The Process of Education. Cambridge: Harvard University Press, 1961.

Bruner, Jerome S. "Some Theorems on Instruction Illustrated with Reference to Mathematics." Theories of Learning and Instruction. 63rd Yearbook, NSSE, Chicago: University of Chicago Press, 1964.

Bruner, J. S. Toward a Theory of Instruction. Cambridge: The Harvard University Press, 1966. (b)

Bruner, J. S. Goodnow, J. J., Austin, G. A. A Study of Thinking. New York: John Wiley and Sons, 1956.

Bugelski, B. R. The Psychology of Learning. New York: Holt, Reinehart and Winston, 1956.

Bugelski, B. R. The Psychology of Learning Applied To Teaching. Indianapolis: The Bobs-Merrill Co., 1971.

Byram, C. A., and Larson, R. (Eds.) Teaching in IPI. Philadelphia: Research for Better Schools.

Campbell, Donald S. "Beyond the Remedial Loop: Toward the Integration of Task and Learner Analysis for a Process Approach to Instructional Development." Paper presented at the Association for Educational Media and Technology Convention, March, 1971.

Coop, Richard H. and Brown, Laurence D. "The Effects of Cognitive Style and Teaching Method on Categories of Achievement," The American Psychological Association, Inc. Issue No. 7 (The Experimental Publication System), 1970, Issue No. 7, Ms. No. 238-4, pp. 1-8.

Coop, R. H. and Sigel, I. E. "Cognitive Style: Implications for Learning and Instruction," Psychology in the Schools, 1971, Vol. 8, pp. 152-161.

Chiu, Lian-Hiwang, "Application of Self-Anchoring Scaling for Study of Teaching Effectiveness," The Journal of Educational Research, 1972, Vol. 65, No. 7, pp. 317-320.

Corwin, R. "Discovery Boxes," Educational Technology, 1972, p. 12.

Davis, A. J. "Cognitive Style: Methological and Developmental Considerations," Child Development, 1971, Vol. 42, pp. 1447-1459.

Davis, J. Kent and Klausmeier, Herbert, J. "Cognitive Style and Concept Identification as a Function of Complexity and Training Procedures," Journal of Educational Psychology, 1970, Vol. 61, No. 6, pp. 423-430.

Davis, Robert H., Marzocco, Frank N. and Denny, M. Ray. "Interaction of Individual Differences with Modes of Presenting Programmed Instruction," Journal of Educational Psychology, 1970, Vol. 61, No. 3, pp. 198-204.

Doty, B. A. and Doty, L. A. "Programmed Instruction Effectiveness in Relation to Certain Student Characteristics," Journal of Educational Psychology, 1964, Vol. 55, pp. 334-338.

DeCecco, J. P. The Psychology of Learning and Instruction, Englewood, Cliffs: Prentice-Hall, 1968.

Deese, James and Hulse, Stewart H. "The Structure of Abilities and the Learning of Skills," The Psychology of Learning, 1958, pp. 446-451.

Dunn, James A. "The Plan Approach to Curriculum Definition," Education, Milwaukee: University of Wisconsin, 1970, Vol. 90, No. 3, Feb.-Mar.

Dunn, Rita and Dunn, Kenneth, Practical Approaches to Individualizing Instruction: Contracts and Other Effective Teaching Strategies, West Nyack, New York: Parker Publishing Co., Inc., 1972.

Edgerton, H. A. The Relationship of Method of Instruction to Trainee Aptitude Pattern, New York: Richardson, Bellows, Henry, 1958.

Emmer, Edmund T., Good, Thomas L. and Oakland, Thomas D. "Effect of Feedback Expectancy on Choice of Teaching Styles," Journal of Educational Psychology, 1971, Vol. 62, No. 6, pp. 451-455.

Farquhar, William M. et.al. "The Michigan State M-Scales." East Lansing: Michigan State University and U. S. Office of Education, Research Project #846, May, 1961.

Finch, Curtis R. "The Effectiveness of Selected Self-Instructional Approaches in Teaching Diagnostic Problem Solving," The Journal of Educational Research, 1972, Vol. 65, No. 5, pp. 219-223.

Flanagan, John C. "Individualizing Education," Education, Milwaukee: University of Wisconsin, Vol. 90, No. 3, Feb.-Mar. 1970, pp. 191-206.

Frederick, W. C. and Klausmeier, H. J. "Cognitive Styles: A Description," Educational Leadership, 1970, Vol. 27, pp. 668-672.

Gage, N. L. "Paradigms for Research on Teaching." Handbook of Research on Teaching. ed. N. L. Gage. Chicago: Rand McNally and Company, 1963.

Gagne, Robert M. "Problem Solving," Categories of Human Learning, ed. Arthur W. Melton, New York: Academic Press, 1964, pp. 311-315.

Gagne, Robert M. The Conditions of Learning. 2nd Ed. New York: Holt, Rinehart and Winston, Inc., 1970.

Garrettson, J. "Cognitive Style and Classification," The Journal of Genetic Psychology, 1971, Vol. 119, pp. 79-87.

Getzels, J. W. and Jackson, P. W. "The Teacher's Personality and Characteristics," Handbook of Research on Teaching. ed. N. L. Gage. Chicago: Rand McNally and Company, 1963.

Gillies, J. and Bauer, R. "Cognitive Styles and Perception of Success or Failure," Perceptual and Motor Skills, 1971, Vol. 33, pp. 839-842.

Glaser, Robert. "The Design and Programming of Instruction," Reprinted from: The Schools and the Challenge of Innovation, Supplementary Paper #28, N.Y., Committee for Economic Development, 1968, pp. 156-215.

Glaser, R. "Individuals and Learning: The New Aptitudes," Education Research, June, 1972, pp. 5-13.

Glaser, Robert. Teaching Machines and Programmed Learning, II, Data and Directions. Wash. D.C.: Association for Educational Communications and Technology, 1965.

Goldman, Roy D. "Effects of a Logical Versus a Minemonic Learning Strategy on Performance in Two Undergraduate Psychology Classes," Journal of Educational Psychology, 1972, Vol. 63, No. 4, pp. 347-352.

Grieve, Tarrance Don and Davis, J. Kent. "The Relationship of Cognitive Style and Method of Instruction to Performance in Ninth Grade Geography," The Journal of Educational Research, 1971, Vol. 65, No. 3, pp. 137-141.

Guilford, J. P. American Psychologist, 1959, Vol. 14, pp. 464-479.

Guilford, J. P. "Intelligence: 1965 Model," American Psychologist, 1966, Vol. 21, pp. 20-26.

Hall, Keith A. and Borman, Karl G. "Prompting and Confirmation as Instructional Strategies with Computer-Assisted Instruction," The Journal of Educational Research, Feb. 1973, Vol. 66, No. 6, pp. 279-285.

Hampton, William. "Audiovisual Technology: Students Find Their Way to Learning With Cognitive Style Mapping," College and University Business, February, 1972.

Hastings, Glen R. "Independent Learning Based on Behavioral Objectives," The Journal of Educational Research, 1972, Vol. 65, No. 9, pp. 411-416.

Hastings, J. Thomas. "The Kith and Kin of Educational Measurers," Journal of Educational Measurement, 1969, Vol. 6, No. 3, pp. 127-130

Hester, R. M. and Tagatz, G. E. "The Effects of Cognitive Style and Instructional Strategy on Concept Attainment," The Journal of General Psychology, 1971, Vol. 85, pp. 229-237.

Hilgard, E. R. Theories of Learning. New York: Appleton-Century - Crofts, 1956.

Hill, J. E. and Nunney, D. N. "Career Mobility Through Personalized Occupational Education," American Vocational Journal, 1971, Vol. 46, pp. 36-39. (a)

Hill, Joseph E. and Nunney, Derek N. "Cognitive Style As An Educational Science," Bloomfield Hills, Michigan: Oakland Community College Press, 1971. (b)

Hill, Joseph E. and Nunney, Derek N. "Personalizing Educational Programs Utilizing Cognitive Style Mapping," Bloomfield Hills, Michigan: Oakland Community College, January, 1971. (c)

Hill, Joseph E. and Nunney, Derek N. "Personalized Educational Programs," Bloomfield Hills, Michigan: Oakland Community College, February, 1971. (d)

Hill, Joseph E. and Nunney, Derek N. "The Educational Sciences," Bloomfield Hills, Michigan: Oakland Community College, February, 1971. (e)

Holland, John L. The Psychology of Vocational Choice. Waltham, Mass: Blaisdel Publishing Company, 1966.

Impellitteri, Joseph T. and Finch, Curtis R. "Review and Synthesis of Research on Individualizing Instruction in Vocational and Technical Education," Columbus, Ohio: ERIC Clearinghouse on Voc. and Tech. Ed., The Ohio State University, Information Series No. 43, VT 013 338, Dec. 1971.

Jensen, Arthur R. "Individual Differences in Visual and Auditory Memory," Journal of Educational Psychology, 1971, Vol. 62, No. 2, pp. 123-131.

Jensen, Arthur. "Genetics and Education: a Second Look," New Scientist, Oct. 12, 1972, pp. 96-98.

Johansson, C. B. "Cognitive Interest Styles of Students," Measurement and Evaluation in Guidance, 1971, Vol. IV, pp. 176-183.

Johnson, Stuart R. and Johnson, Rita B. Developing Individualized Instructional Material. Palo Alto, Calif: Westinghouse Learning Press, 1970.

Jung, Steven M. "Guidance Testing and the Individualized Program of Studies," Education, Milwaukee: University of Wisconsin, Vol. 90, No. 3, Feb.-Mar. 1970, pp. 227-231.

Kagan, J., Moss, H. A. and Sigel, I. E. "Conceptual Style and the Use of Affect Lables," Merrill-Palmer Quarterly, 1960, Vol. 6, pp. 261-278.

Kagen, J., Moss, H. A. and Sigel, I. E. "The Psychological Significance of Styles of Conceptualization." In J. F. Wright and J. Kagan (Eds.). "Basic Cognitive Processes in Children," Monograph of the Society for Research in Child Development, 1963, Vol. 28, pp. 73-112.

Kagen, J. "Reflection-Impulsivity: The Generality and Dynamics of Conceptual Tempo," Journal of Abnormal Psychology, 1966, Vol. 71, pp. 17-22.

Kagan, J., Rosman, B., Day, D., Albert J. and Phillips, W. "Information Processing in The Child: Significance of Analytic and Reflective Attitudes," Psychological Monographs, 1964, Vol. 78 (1, Whole No. 578.

Klausmeier, H. J. and Ripple, R. E. Learning and Human Abilities. New York: Harper and Row, 1971.

Krogstad, Roland J. "Preliminary Considerations in the Development of Studies of the Interactions of Individual Learning Styles with Components of Individualized Instruction in Vocational, Technical and Adult Education." Madison: Wisconsin Board of Vocational, Technical and Adult Education, Dec. 1972, (Xeroxed).

Lee, L. C., Kagan, J. and Rabson, A. "The Influence of a Preference for Analytic Categorization Upon Concept Acquisition," Child Development, 1963, Vol. 34, pp. 433-442.

Lovaas, O.I. "Interaction Between Verbal and Nonverbal Behavior," Child Development, 1961, pp. 329-36.

Lublin, S. C. "Reinforcement Schedules, Scholastic Aptitude, Autonomy, Need and Achievement in a Programmed Course," Journal of Educational Psychology, 1965, Vol. 56, pp. 295-302.

Lumsdaine, A. A. "Instruments and Media of Instruction." Handbook of Research on Teaching. ed. N. L. Gage. Chicago: Rand McNally and Company, 1963

McClosky, M. G. Teaching Strategies and Classroom Realities. Englewood Cliffs: Prentice-Hall, 1971.

Marzocco, F. N., Davis, R. H. and Denny, M. R. "Interaction of Individual Differences With Modes of Presenting Programmed Instruction," Journal of Educational Psychology, 1970, Vol. 61, pp. 198-204.

Mathis, Arthur, Smith, Timothy and Hansen, Duncan. "College Students' Attitudes Toward Computer-Assisted Instruction," Journal of Educational Psychology, 1970, Vol. 61, No. 1, pp. 46-51.

Newsom, R. S., Eischens, Roger and Looft, William R. "Intrinsic Individual Differences: A Basis for Enhancing Instructional Programs, The Journal of Educational Research, 1972, Vol. 65, No. 9, pp. 387-392.

Oliver, R. and Hornsby, J. "On Equivalance." In Bruner, Oliver and Greenfield, Studies in Cognitive Growth. New York: John Wiley, 1966.

Osipow, S. H. "Cognitive Styles and Educational-Vocational Preferences and Selection," Journal of Counseling Psychology, 1969, Vol. 16, pp. 534-546.

Penk, W. E. "Development Patterns of Conceptual Styles," Psychological Reports, 1971, Vol. 29, pp. 635-649.

Quirk, Thomas J., Steen, Margaret T. and Lipe, Dewey, "Development of the Program for Learning in Accordance with Needs Teacher Observation Scale," Journal of Educational Psychology, 1971, Vol. 62, No. 3, pp. 188-200.

Rhetts, John E. "The Impact of Student Learning Style on Curriculum Assignment and Performance in the Plan Program of Individualized Instruction," Education, Feb.-Mar. 1970, Vol. 90, No. 3, pp. 248-251.

Ripple, R. E. Readings in Learning and Human Abilities. New York: Harper and Row, 1964.

Rosenberg, M. B. Diagnostic Teaching. Seattle: Special Child Publications, 1968.

Rosenstein, J. "Concept Development and Language Instruction of the Deaf," Exceptional Children, 1964, Vol. 30, pp. 337-343.

Rychlak, Joseph F. and Tobin, Thomas J. "Order Effects in the Affective Learning Styles of Overachievers and Underachievers," Journal of Educational Psychology, 1971, Vol. 62, No. 2, pp. 141-147.

Scanlon, R. G. Progress Report. Philadelphia: Research for Better Schools, 1972.

Schoer, L. "Reactive Inhibition as Related to Performance on Programmed Learning Materials." Journal of Educational Psychology, 1966, Vol. 57, pp. 86-88.

Seagoe, May V. The Learning Procedure: A Teacher's Guide to the Learning Process. Second Edition, Dubuque, Iowa. William C. Brown Company Publishers, 1961, pp. 156-181.

Shouksmith, G. "Personality Attributes Associated with Two Measures of Cognitive Style." Acta Psychology, 1969, Vol. 31, pp. 353-364.

Siegel, L. and Siegel, L. "Educational Set: A Determinant of Acquisition," Journal of Educational Psychology, 1965, Vol. 56, pp. 1-12.

Slatterly, D. J. and Brimer, M. A. "Cognitive Styles and School Learning," The British Journal of Educational Psychology, 1971, Vol. 41, pp. 294-303.

Snow, R. E., Tiffin, J. and Seibert, W. F. "Individual Differences and Instructional Film Effects," Journal of Educational Psychology, 1965, Vol. 56, pp. 315-326.

The Society For Research in Child Development. Cognitive Development in Children. Chicago: The University of Chicago Press, 1970. (Five Monographs of the Society.)

Solomon, Daniel, Bezdek, William E. and Rosenberg, Larry. Teaching Styles and Learning. Chicago: Center for the Study of Liberal Education for Adults, 1963.

Spanbauer, Stanley. "Predicting Success in Teaching." Unpublished Field Study, University of Wisconsin-Stout, 1972.

Stephens, M. W., and Michels, K. M. Motivational Correlates of Individual Differences in Performance. (AMRL-TR-65-39) Dayton: Wright-Patterson Air Force Base, Ohio: Behavioral Sciences Laboratory, Aerospace Medical Division, Air Force Systems Command, May, 1965.

Stern, George G. "Measuring Noncognitive Variables in Research on Teaching." Handbook of Research on Teaching. ed. N. L. Gage. Chicago: Rand McNally and Company, 1963.

Stolurow, L. M. "Social Impact of Programmed Instruction: Aptitudes and Abilities Revisited," In J. P. DeCecco (Ed.), Educational Technology, New York: Holt, Rinehart and Winston, 1964.

Stufflebeam, Daniel L., et al. Educational Evaluation and Decision Making, Bloomington: Ind. Phi Delta Kappa, Incorporated, 1971.

Suchman, J. R. "Inquiry Training: Building Skills for Autonomous Discovery," Merrill-Palmer Quarterly, 1961, Vol. 7, pp. 147-169.

Taba, H., Levine, S. and Elzey, F. F. Thinking in Elementary School Children. San Francisco: San Francisco State College, 1964.

Tallmadge, G. Kasten and Shearer, James W. "Interactive Relationships Among Learner Characteristics, Types of Learning, Instructional Methods, and Subject Matter Variables," Journal of Educational Psychology, 1971, Vol. 62, No. 1, pp. 31-38.

Tallmadge, G. Kasten and Shearer, James W. "Relationships Among Learning Styles, Instructional Methods, and the Nature of Learning Experiences," Journal of Educational Psychology, 1969, Vol. 60, No. 3, pp. 222-230.

Tennyson, Robert D. and Woolley, F. Ross. "Interaction of Anxiety with Performance on Two Levels of Task Difficulty," Journal of Educational Psychology, 1971, Vol. 62, No. 6, pp. 463-467.

Traweek, M. W. "The Relationship Between Certain Personality, Variables and Achievement Through Programmed Instruction," California Journal of Educational Research, 1964, Vol. 15, pp. 215-220.

Tyler, Ralph W. ed. Educational Evaluation: New Roles, New Means. NSSE Yearbook LXVII, Part II, Chicago, Ill: Univ. of Chicago Press, 1969.

Van Dyke, Bill F. and Newton, John M. "Computer-Assisted Instruction: Performance and Attitudes," The Journal of Educational Research, 1972, Vol. 65, No. 7, pp. 291-293.

Wadsworth, B. J. Piaget's Theory of Cognitive Development. New York: David McKay, 1971.

Walberg, Herbert J. and Ahlgren, Andrew. "Predictors of the Social Environment of Learning," American Educational Research Journal, 1970, Vol. VII, pp. 153-167.

Wallen, Norman E. and Travers, Robert M. W. "Analysis and Investigation of Teaching Methods." Handbook of Research on Teaching. ed. N. L. Gage. Chicago: Rand McNally and Company, 1963.

Webster, William J. and McLeod, Gordon K. "An Empirical Approach to Curriculum Design," Education, Milwaukee: University of Wisconsin, Feb.-Mar. 1970, Vol. 90, No. 3, pp. 252-260.

Wepman, J. M. "Auditory Discrimination, Speech, and Reading," Elementary School Journal, 1960, Vol. 60, pp. 375-383.

White, Frances Jayne. "Observational Learning of Indirect Verbal Behavior Through the Medium of Audio-Tapes," The Journal of Educational Research, 1972, Vol. 65, No. 9, pp. 417-419.

Wineman, J. H. "Cognitive Style and Reading Ability," California Journal of Educational Research, 1971, Vol. 22, pp. 74-79.

Witkin, H. A., Dyk, R. B., Faterson, H. F., Goodenough, D. R. and Karp, S. A. Psychological Differentiation. New York: Wiley, 1962.

Wright, Calvin E. "Project Plan Progress Report," Education, Milwaukee: University of Wisconsin, Feb.-Mar. 1970, Vol. 90, No. 3, pp. 261-269.

Yando, R. M. and Kagan, J. "The Effect of Teacher Tempo on the Child," Child Development, 1968, Vol. 39, pp. 27-34.

Yeatts, Pearline P., and Strag, Gerald A. "Flexibility of Cognitive Style and Its Relationship to Academic Achievement in Fourth and Sixth Grades," The Journal of Educational Research, 1971, Vol. 64, No. 8, pp. 345-346.

Yee, Albert H. "Every Kid a Winner: Accountability in Education--A Review," The Journal of Educational Research, 1972, Vol. 65, No. 7, pp. 301-303.

OTHER SOURCES

Banks, John C. Research Assistant and Subproject Director of the Learning Styles Project. Menomonie, Wisconsin: Center For Vocational, Technical and Adult Education, University of Wisconsin-Stout, 1973.

Oen, Urban T. "Interviews with University Staff and Review of Literature on Learning Styles," University of Illinois, Urbana, Ill. and University of Wisconsin-Stout, Menomonie, Wisc., Jan. 19, 1973.

APPENDIX A

LEARNING ACTIVITIES OPINIONNAIRE

The following survey form describes various activities that you may use in learning skills and knowledges. Some of these activities may be of more value to you than other activities. What we want you to think about is "how" you are best able to learn. What things motivate you to learn and while learning what activities prove valuable to you.

This is not an evaluation of the class you are presently in but an attempt to determine which learning activities are best suited to you as an individual. When you read these statements think about all of the classes you have taken, and the learning activities that proved valuable to you.

Please follow the example below when completing the I.B.M. answer form. Fill in all information clearly and legibly. Leave the identification block blank.

_____Date_____Age___Sex___Date of Birth____
Last First Middle
School_____City_____Grade or Class_____Program_____
Name of Test_____Part~~2~~ 1 ~~2~~

Please turn to the following page, read the instructions and begin.

Learning Activities Opinionnaire

Directions: The statements below describe a variety of activities used to learn skills and knowledges. Read each statement. Respond to the statement on the basis of its value to you in a learning situation. React according to the following scale:

1 - Of No Value, 2 - Somewhat Valuable, 3 - Of Average Value,
4 - Very Valuable, 5 - Extremely Valuable

Place your answers on the answer sheet provided. Darken the space under the number that represents your response. Be sure to go across the answer sheet. There are no right or wrong statements - just the value to you in learning.

		Of No Value	Somewhat Valuable	Of Average Value	Very Valuable	Extremely Valuable
1.	Working with tools, equipment, apparatus and materials.	1	2	3	4	5
2.	Working and meeting with individuals or groups of people to learn new information and ideas.	1	2	3	4	5
3.	Activities involving the use of scale models, devices, and simulated situations. (Role playing, driver training simulator, games).	1	2	3	4	5
4.	Activities that teach job skills.	1	2	3	4	5
5.	Learning activities in which information and skills are presented by television, teacher or a classmate.	1	2	3	4	5
6.	Activities that allow me to immediately apply what I learn to actual problems I face.	1	2	3	4	5
7.	Learning experiences that only use verbal presentation to teach new information.	1	2	3	4	5
8.	Instruction using media (films, tapes, slides) to pictorially and graphically describe events, skills and procedures.	1	2	3	4	5
9.	Instruction dealing with formulas and symbols which describe the knowledges to be learned.	1	2	3	4	5
10.	Instruction based mainly on reading.	1	2	3	4	5
11.	Verbal instruction (written or oral) presented by a teacher with support of films, slides, and tapes.	1	2	3	4	5

		Of No Value	Somewhat Valuable	Of Average Value	Very Valuable	Extremely Valuable
12.	Classes where everything is set up allowing me no choice in determining goals or objectives.	1	2	3	4	5
13.	Teacher organized instruction where I have little influence on the type of instructional material and learning activities used.	1	2	3	4	5
14.	Class situations that lead me from simple to complex learning activities with predetermined goals, objectives and sequence.	1	2	3	4	5
15.	Working alone but with constant teacher supervision and organization.	1	2	3	4	5
16.	Organized situations from simple to complex giving me a choice of where I want to start, stop or branch out to new experiences.	1	2	3	4	5
17.	Learning activities that have no preset goals, you just set your own and do what you want.	1	2	3	4	5
18.	Working alone and setting my own pace, determining my own goals and objectives.	1	2	3	4	5
19.	Courses that allow me to establish my own learning sequence and activities.	1	2	3	4	5
20.	Student designed, and directed instructional activities.	1	2	3	4	5
21.	Classes involving a minimum amount of organization.	1	2	3	4	5
22.	Instruction completely organized by me.	1	2	3	4	5

APPENDIX B

LEARNING STYLES PROJECT BIBLIOGRAPHY

1. Investigating the Interaction of Learning Styles and Types of Learning Experiences in Vocational-Technical Education. Interim Report. Appleton, Wisconsin: Fox Valley Technical Institute, August 31, 1973.

2. An Investigation of the Interaction of Learning Styles and Types of Learning Experiences In Vocational-Technical Education. Final Report of a Subproject with Fox Valley Technical Institute. (John Banks) Menomonie, Wisconsin: Center for Vocational, Technical and Adult Education, University of Wisconsin - Stout, June, 1973.

3. Student Survey, Final Report. Appleton, Wisconsin: Fox Valley Technical Institute, June 29, 1973.

4. "Teacher Survey on Individualized Instruction at Fox Valley Technical Institute," Final Report. Appleton, Wisconsin: Fox Valley Technical Institute, June 29, 1973.

5. "Summary of Supervisory Comments Concerning Individualized Instruction at Fox Valley Technical Institute," Final Report. Appleton, Wisconsin: Fox Valley Technical Institute, June 29, 1973.

6. "Personalizing Educational Programs at Fox Valley Technical Institute," Appleton, Wisconsin: Fox Valley Technical Institute, June 4, 1973. (This report contains the model for individualizing instruction).